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JULY 5, 1954

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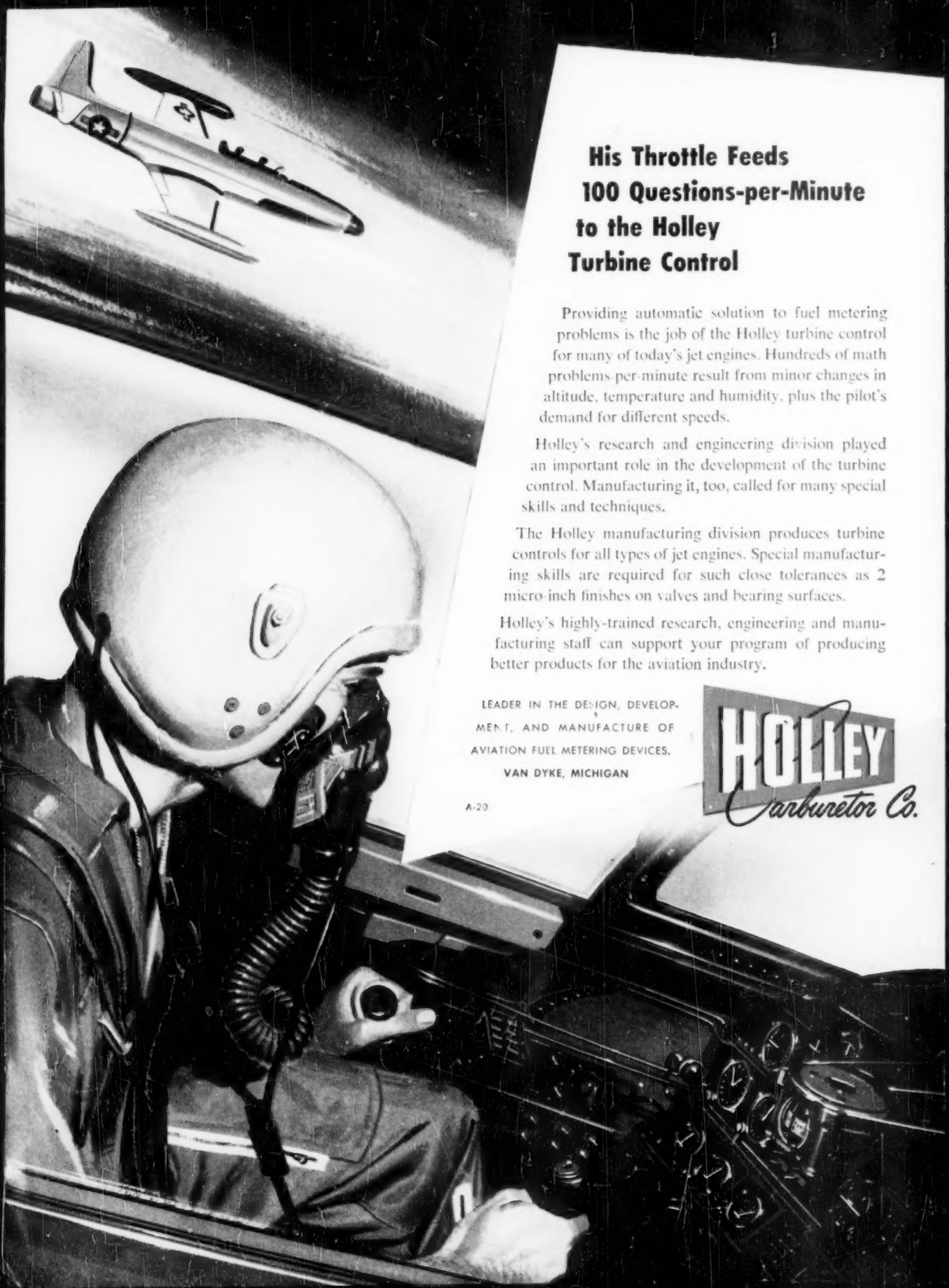

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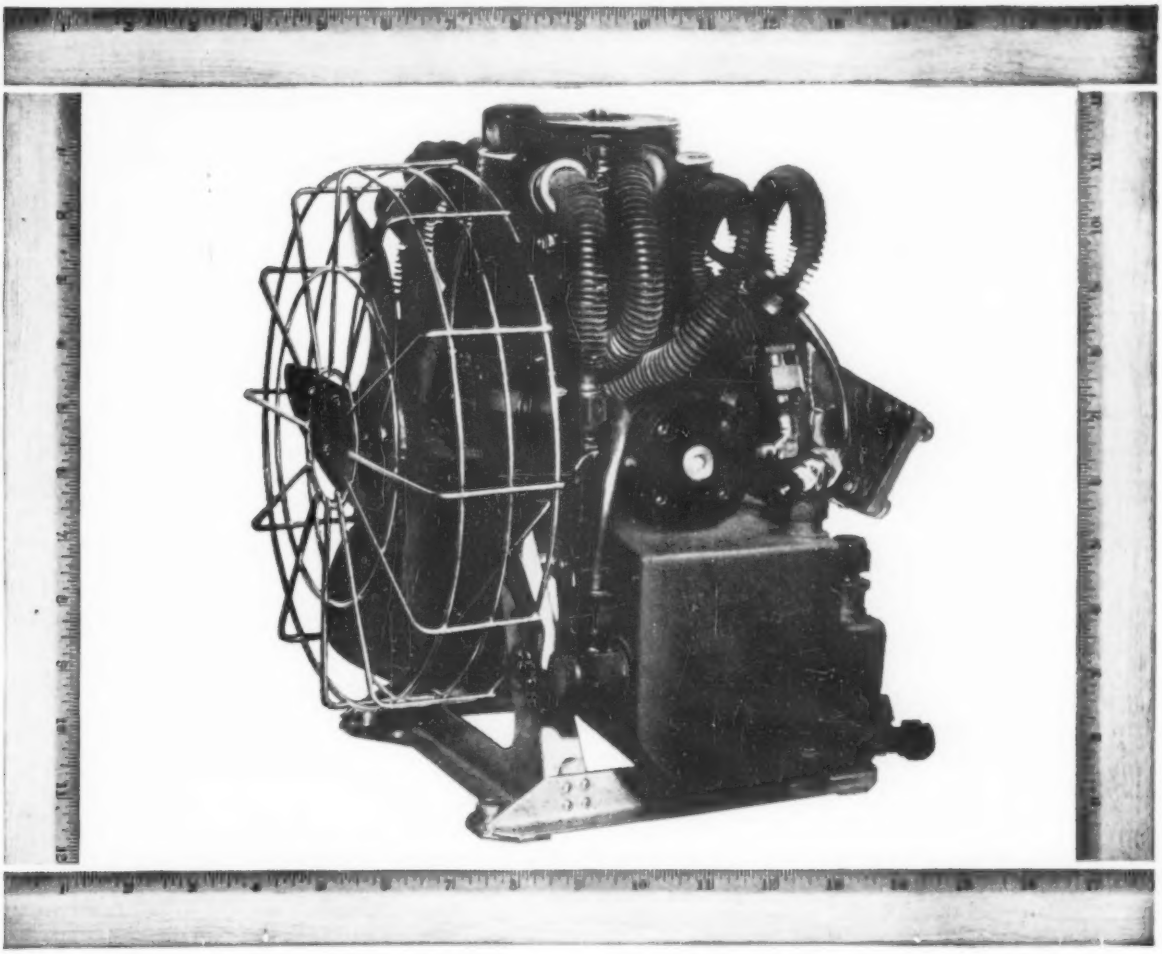

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†Gives certified insulated record protection day and night at point-of-use.

# NEWS DIGEST

## USAF Douglas RB-66A Twin-Jet Bomber Makes First Flight

The 700-mph.-class Douglas RB-66A, reconnaissance-bomber version of the Navy A3D Skywarrior, is seen during its first flight in which the sweptwing craft flew from Long Beach, Calif., to Edwards AFB, Calif. Powerplants of the RB-66A are Allison J71s of approximately 9,500 lb. thrust each. Navy production A3Ds are powered by 10,000-lb.-thrust-class P&WA J57s.

## Domestic

**American Airlines** Convair 240 and a twin-engine Navy Beech JRB collided in the air last week as they approached Columbus (Ohio) Airport for landings. The Convair made a one-engine emergency landing without injury to the 34 persons aboard; but the Navy craft crashed in flames, killing its two-man crew.

**Lockheed Aircraft Corp.** has won a $50-million USAF contract to build 20 additional turboprop C-130A cargo transports at the Marietta (Ga.) Division. The new contract includes spares, special tools for field bases plus ground handling equipment.

**Civil Aeronautics Board last week** issued a tentative decision in the reopened southern-service-to-the-west case authorizing Braniff and TWA to provide through air service on one daily roundtrip between Texas and California. CAB gave the airlines 30 days to come to an agreement in the matter. Board also reaffirmed its Dec. 22 decision that service between Houston, Tex. and Miami, Fla., could best be operated by Eastern and National and gave them 60 days to reach and file an agreement for such service. Eastern was also denied authority to conduct trans-Gulf operations between Tampa, Fla. and Houston, Tex.

**Javelin Aircraft Co.**, Wichita, has an Army Signal Corps contract to develop an installation for its single-axis automatic pilot for the Cessna L-19. Company now is producing 10 units weekly, is tooled to make 100 a month and has scheduled 170 for July. Cessna is taking all commercial models for its 170 and 180 planes (AVIATION WEEK June 21, p. 7).

**Aeronautical Engineering Professorship** will be established at the Massachusetts Institute of Technology in honor of Dr. Jerome C. Hunsaker, chairman of the National Advisory Committee for Aeronautics, from a $275,000 fund donated by the aircraft industry.

**William C. McDuffie** is new board chairman of Northrop Aircraft, Inc., Hawthorne, Calif., taking over one of the positions held by the late Gen. Oliver P. Echols.

**United Air Lines** has taken delivery on the last of 55 Convair 340s ordered for medium and shorthaul operations, completing a $37,170,000 purchase.

**Maj. Charles E. Yeager**, first man to fly faster than sound, was awarded the Distinguished Service Medal by Assistant Secretary for Air Roger Lewis June 26 at Edwards AFB, Calif.

**Wallace Aviation Corp.** has been formed in Wallingford, Conn., to make jet compressor blades and components by a cold rolling and precision forming process adaptable to non-strategic materials. Firm begins with a $1-million-plus backlog. Stockholders include R. Wallace & Sons, Laurance S. Rockefeller and Reaction Motors, Inc.

**Charles J. McCarthy**, is new board chairman of Chance Vought Aircraft, Inc., succeeding H. M. Horner, United Aircraft Corp. president, resigned from the Vought board effective July 1. McCarthy has resigned as vice president of UAC. He was formerly general manager of Vought Division.

**Harry K. Coffey**, late chairman of the National Aeronautic Assn. who was killed when his Beech Bonanza crashed last month, left an estate estimated at $1 million. His grandson and a friend also died in the crash (AVIATION WEEK June 21, p. 7).

## International

**Turboprop Viscount production** will be increased by Vickers-Armstrongs to 100 a year under plans to expand the British company's plant at Bournemouth (Hurn) Airport, where manufacture of the transport is concentrated. Present Viscount production rate: two to three a month.

**Sfecma's ARS. 5501** guided missile now is ground recoverable after use, the French aircraft builder reports. Previously, the missile could be recovered only when it landed in water.

**Aircraft expenditures** by the Canadian government will total $425 million-$450 million during 1954 and for several years to come, Defense Minister Brooke Claxton reports. This is approximately a quarter of the total defense appropriation.

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# The Aviation Week

## July 5, 1954

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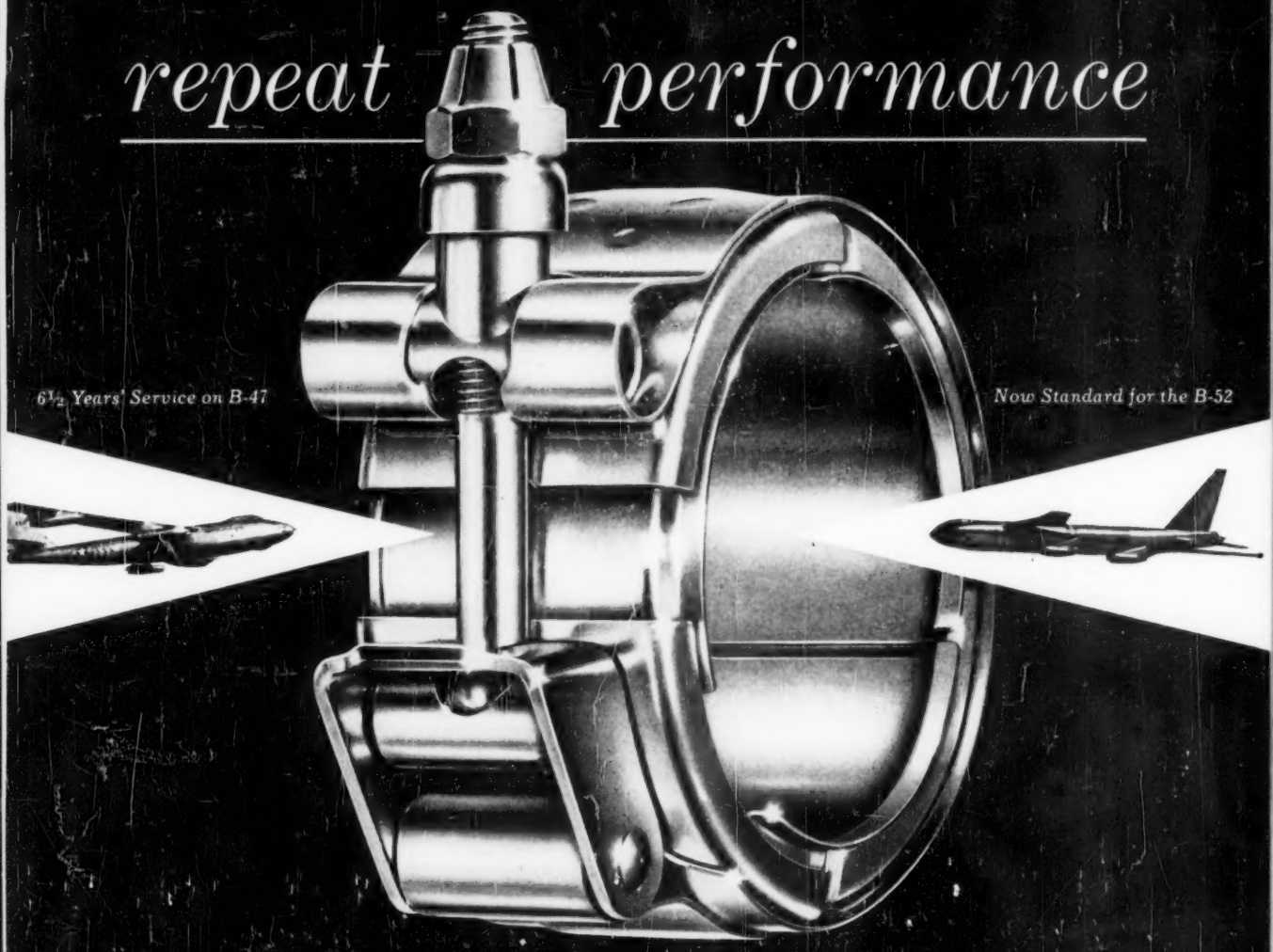
**FIRST PRODUCTION** Martin P5M-2 Marlin anti-sub flying boat, distinguished from the earlier P5M-1 by its T-tail, has been delivered to the Navy. Packed with electronic gear, the new Marlin has two 3,450-hp. (dry) Wright R3350-32W Turbo Compounds.

# Naval Aircraft in the News Spotlight

**SUB SNOOPING TECHNIQUE** using "dipping sonar" to detect underwater craft, is demonstrated by Navy's big Bell HSL-1 tandem-rotor copter. The HSL-1 carries lightweight homing weapons to kill subs located by its detection devices.

**SPEED MARK** of 2 hr. 38 min. was set recently for 1,086-mi. distance between Indianapolis, Ind., and Opa Locka, Fla., by this production Douglas A2D-1 Skylark (below). Powered by 5,850-eshp. Allison T40-A-6 turning contra-rotating Aeroproducts props, this and another Skyshark are used by Allison as testbeds for T40 development. T40s with contraprops also are flying in Convair's R3Y-1 flying boats and are being produced for the new R3Y-2 "bow loader" version.

# *repeat performance*

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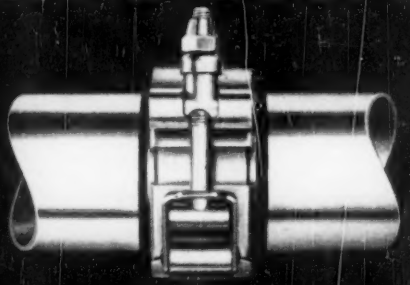

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# WHO'S WHERE

## In the Front Office

**John L. Hallett**, former executive vice president of Kaiser Motors Corp., has been appointed vice president-aircraft production for Kaiser Metal Products, Inc., Bristol, Pa. **Paul C. Meyer** is new vice president-administration.

**R. S. Bowditch** has become general manager for American Gyro Corp., Santa Monica, Calif. Also appointed: **R. B. Kees**, executive vice president; **D. J. Santogrossi**, chief engineer.

**John M. Case** has moved up to executive vice president of Fairchild Camera & Instrument Corp., Syosset, N. Y.

**Rafael Rivas Vazquez** and **Lorenzo G. del Portillo** are new vice presidents of Cubana, Cuban airline.

## Changes

**I. E. Sommermeyer** has been promoted by United Air Lines to director of flying. Other flight operations changes: **E. P. Lott**, methods, operations analysis and accounting assistant to the vice president; **D. C. Lynch**, administrative assistant to the vice president; **N. F. Timper**, manager of system operations.

**William P. Munger** has been appointed engineering and research manager for Reaction Motors, Inc., Rockaway, N. J.

**W. R. Miller** is new assistant general manager of Rheem Manufacturing Co.'s Aircraft Division, Downey, Calif. Also moved up: **Paul R. Holmes**, chief of government planning; **C. W. Felker**, general superintendent; **R. H. King**, chief of master planning and industrial engineering; **John F. Taggert**, government contracts manager in Washington, D. C.

**J. C. Sprague** has become engineering manager and **H. M. Reigner** is sales manager of Eaton Manufacturing Co.'s new Aircraft Division, Battle Creek, Mich.

**Hale P. Faris** has been named general sales manager for Motordyne, Inc., Monrovia, Calif.

**Stuart N. Smith** has been appointed works manager for Twin Coach Co.'s Aircraft Division, Buffalo, N. Y.

**Saul N. Schonfeld** is now chief application engineer for Avien, Woodside, N. Y., succeeding **Frank DeNardo**, who has become regional engineering representative for Cal-Avien, Culver City, Calif.

**Sverre Marcussen** has become sales manager for Icelandic Airlines; **John Simons** has been promoted to agency and interline manager.

**Aubrey Raymond** has been appointed to the legal staff of Republic Aviation Corp., Farmingdale, N. Y.

## Honors and Elections

**Sen. Patrick A. McCarran** has received the Aero Club of Washington's Citation of Achievement for his role in developing and encouraging civil aviation.

**Harold C. Stuart**, onetime Assistant Secretary of the Air Force, has been elected president of the Aircraft Service Assn.

# INDUSTRY OBSERVER

► Airframe manufacturers are watching closely USAF policy on jet tanker procurement. Top-level USAF brass has assured the industry that its jet tanker procurement will be guided by results of Air Research and Development Command design study proposals (AVIATION WEEK May 17, p. 10, June 7, p. 11). However, there are persistent rumors that an order for Boeing 707 jet tanker already is in the mill, backed by strong support from the Strategic Air Command.

**► USAF quietly is making studies on the requirements for Civil Aeronautics Administration certification of the KC-97G aerial tanker. With plans for replacing these piston-powered tankers with jet tankers capable of refueling jet bomber fleets at economic speeds and altitudes, USAF hopes to be able to offer part of its fleet of 800 C-97s, of which 500 already have been built for surplus sale to commercial operators.**

► Ryan's delta-wing, jet-powered, vertical-takeoff fighter is partially visible over the top of a temporary wooden fence at the company's San Diego, Calif., plant. The Ryan VTO originally was a Navy project, but was taken over by USAF when Navy funds ran low. It is powered by a Westinghouse J40 turbojet.

**► Bell Aircraft Corp. is putting the final touches on its second VTO prototype. The first was almost completely destroyed by a ground fire at the Wheatfield, N. Y., plant last February (Aviation Week Mar. 1, p. 11). The Bell approach to the VTO problem involves the use of tilted jet engines on the wing tips and aims at getting some lift from the wing in a steep 70-deg. takeoff rather than a completely vertical takeoff hanging on the jet stream. Jet engines rather than entire plane would tilt into position for level flight.**

► Canadian Avro president Crawford Gordon officially confirmed in a London press conference June 24 that his firm is developing a new extremely high-powered jet engine. AVIATION WEEK reported June 14 that Avro is developing an 18,000-lb.-thrust turbojet of advanced design to power a Mach 2 all-weather fighter. Gordon said Avro of Canada is developing the new turbojet as a private venture.

**► Vickers-Armstrongs, Ltd., has received an RAF production order for its V-1000 sweptwing jet transport. The V-1000 is powered by four Rolls-Royce Conway by-pass engines delivering about 11,000 lb. thrust.**

► Cessna Aircraft's Helicopter Division is progressing on its program to get Civil Aeronautics Administration certification for its CH-1 four-passenger helicopter. Final tests are scheduled for completion by fall.

**► Marine Corps is experimenting with helicopter camouflage at Quantico, Va. First Sikorsky H-19, painted to blend with local Virginia terrain, will be repainted for evaluation against other climatic backgrounds such as desert sand, arctic ice and tropical jungle.**

► Glenn L. Martin Co. Oriole missile is another casualty of the Pentagon missile re-evaluation program. The Navy-sponsored Oriole was planned as an air-to-air missile using a solid propellant engine providing a range of about five miles.

**► USAF is investigating the problems in establishing a third and fourth source of production for the Boeing B-52 Stratofort. Douglas plant at Tulsa and Lockheed's Georgia Division at Marietta, both of which now are building Boeing B-47s, are considered the most likely spots for additional B-52 production. Boeing now is building the B-52 at Seattle, Wash., and is tooling up for second-source production at its Wichita, Kan., plant.**

► Chicago's Helicopter Air Service, operating six Bell 47s in 1953, reports total operating costs average $37.7 per flight hour. U.S. government puts about $500,000 a year into the operation through mail subsidies.

# Washington Roundup

## Atomic Reverse?

Don't be surprised if Defense Secretary Charles E. Wilson's 1953 decision to soft-pedal development of an atomic-powered long-range bomber soon is reversed by higher authority.

Accelerated technical progress on nuclear aircraft powerplant (AVIATION WEEK May 24, p. 28; June 14, p. 14) combined with the rapid pace of Russian developments in the gas turbine-powered bomber field have stirred a new high-level re-evaluation of the USAF atomic-powered aircraft program.

Feeling is that Russia is getting dangerously close in jet development and USAF must reach out into nuclear-powered aircraft if it is to maintain a significant technical advantage over the Russians in atomic and hydrogen-bomb delivery methods.

## Aircraft Plant Tour

Top USAF materiel and development officials still are touring the aircraft industry (AVIATION WEEK June 14, p. 13) for technical briefings and evaluation of new military hardware for which future procurement obligations are being programmed but not yet committed.

## Foreign Invasion

Although British aircraft sales to U. S. customers are drawing the headlines, both French and Italian firms have entered the domestic market. Piaggio of Genoa is scheduled to deliver its first five-place amphibian to a Milwaukee firm in July, while Sncaso has a Djinn helicopter earmarked for fall delivery to an American crop-dusting firm.

Civil Aeronautics Administration certification group is giving priority to getting these types approved for U. S. operations, in addition to the 800-lb.-thrust French Marbore jet that Transocean Air Lines wants to use in a C-46 pod installation.

## CAA Survey

Fred Lee, Civil Aeronautics Administrator, has been ordered by his superior Commerce Department officials to throw a tight administrative security cloak over the highly controversial CAA management survey recently completed by Cresap, McCormick and Paget, Chicago efficiency experts. Study has been delivered to Lee.

Colin McIntosh, former vice president of Allegheny Airlines and Air Coordinating Committee consultant, has been appointed by Commerce Department to evaluate the CAA study.

## Airline Fares

Observers call the appointment of an eight-man committee by Air Transport Assn. to investigate ways of increasing airline revenue "just window-dressing."

Reason: Civil Aeronautics Board sharply limited the area the airlines could consider in discussing means to raise their incomes. Rates and fares specifically were eliminated (AVIATION WEEK June 28, p. 28). Now ATA can report that after consideration of the remaining revenue-raising factors by its committee the subject matter must be broadened.

Most promising idea, in the committee's opinion, was to find ways of handling the "no-show" problem, and this idea is not new. ATA will ask CAB to reconsider its request and permit rates and fares to be discussed.

## Airport Fees

User fees at Washington National Airport are going to be increased whether or not the airport is reorganized as a separate corporation, according to Civil Aeronautics Administrator Fred Lee.

Meanwhile, the renewed prospect of a second Washington airport has complicated action on incorporating Washington National. CAA's plan now is to have one corporation operate both.

Members of the committee suggested that the incorporation legislation should be rewritten to provide for this at the outset.

## New Air Force

New Pacific Air Force, with headquarters in Hawaii, will be headed by Maj. Gen. Sory Smith, retiring chief of USAF public information. PAF will operate under Adm. Felix Stump as the Air Force component of his Pacific Fleet Command. Internal affairs of PAF will be under control of the Far East Air Forces.

Gen. Smith will be replaced as chief of public information by Brig. Gen. Brooke E. Allen (AVIATION WEEK June 21, p. 9).

## Manpower Problem

Watch for a wave of national advertising encouraging young men to join USAF. At recent Pentagon meeting, instigated by aircraft and airline industry executives, serious manpower situation was outlined to advertising and public relations directors of about 90 major companies.

Presided over by C. R. Smith of American Airlines, session was told why USAF must have more re-enlistments and 200,000 new men each year. Committee composed of Emmett A. McCabe of Convair, Ken Ellington of Republic and cartoonist Milton Caniff will coordinate industry effort. Brig. Gen. Arno Luehman, former deputy chief of USAF public relations, heads drive for USAF.

## USAF Staff Shuffle

Proposed reorganization of the USAF headquarters staff would restore the Deputy Chief of Staff for Development to equal status with the Deputy Chief of Staff for Materiel.

Development deputy was subordinated to materiel in a 1953 reorganization aimed at better coordination between Air Materiel Command and Air Research and Development Command.

## Pilot Fight

Air Line Pilots Assn. is pushing hard on Capitol Hill for legislation before Congress adjourns setting an 8-hr. maximum flight limitation on domestic airlines. Civil Aeronautics Board recently granted a waiver to allow airlines 10-hr. maximum on nonstop flights (AVIATION WEEK June 21, p. 16).

—Washington staff

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*AHS Forum Report:*

# Helicopter Builders Grapple With Cost

- **Army, airlines may join to get design economy.**
- **Engineers offer formula for transport profits.**

By Claude O. Witze

Customer demand for helicopters that are less expensive to buy and cheaper to operate is fast becoming one of the most important competitive factors in the industry.

A representative of the Air Transport Assn., familiar with past extravagant claims for rotary-wing transports, told the 10th annual forum of the American Helicopter Society he was "thunderstruck" by the substantial progress made since last year's meeting.

His comment was made after hearing a helicopter manufacturer report on a study of the fundamental cost factors considered by an airline in evaluating his product.

▶**Highest Profit**—This praise for the fast-growing maturity of the industry was caused by F. David Schneely and Richard M. Carlson of Hiller Helicopters, Palo Alto, Calif., who presented a report entitled: "Optimum Design of Transport Helicopters for Maximum Net Profit."

Their thesis was that an engineer designing a transport helicopter must not be content with producing a machine capable of the best possible speed or payload or range.

He also must turn out a vehicle capable of making the highest possible profit for the commercial operator, Schneely and Carlson said.

▶**Cost Warning**—Meanwhile, the U.S. Army, biggest present and potential user of rotary-wing aircraft, continued its warnings that costs must come down if they are not to jeopardize the entire ambitious military helicopter program.

Giving first indication that the Army now has joined forces with the airlines to force industry action, Maj. Michael J. Strok of the Office of the Chief of Transportation told the forum he believes Army requirements are close to those of the commercial operators.

"With this in mind," he declared, "we are pressing for Civil Aeronautics Administration certification of those helicopters intended for Army use provided that military requirements and utility are not seriously compromised."

The Army has said it will demand 1,000-hr. service life for components in future helicopter competitions (AVIATION WEEK May 24, p. 18). Strok added that he expects higher speeds and ability to fly in bad weather at least comparable to present twin-engine airplanes.

▶**Industry Approach**—Trend in helicopter industry thinking can be traced in forum programs:

- In 1953, the subject of costs was discussed at a round-table session where major manufacturers agreed only that high unit purchase prices will be cut with high-volume production.
- This year the Hiller study was viewed as a realistic approach to the commercial sales problem. Maj. Strok made it clear that the military customer, following recent recommendations of the Air Coordinating Committee, will demand an aircraft no more complicated or expensive and just as safe as the commercial machine.
- Major theme for the 1955 forum will be the commercial market, including both airline and industrial users. Instead of the usual chairman selected from the engineering or manufacturing field, the forum will be headed by CAA's Richard K. Waldo.

▶**Transport Formula**—Major contribution of the Schneely-Carlson report was a formula for determining costs involved in the operation of a transport helicopter. To demonstrate their estimating methods, the two engineers applied their system to three hypothetical helicopters of 10-, 20- and 35-passenger capacity.

Much of the data had to be estimated or adapted from figures commonly used for fixed-wing aircraft. Nevertheless, it was concluded that a 35-passenger copter that can be produced today might lose less money on shorthaul operations than fixed-wing planes now in operation.

The forum was told that premium fares for a service not otherwise available may be justified in these early days of helicopter transportation, but designers eventually must use cost analyses to find the best and most profitable configuration for airline purposes.

In estimating indirect operating costs, the authors followed the average of all

## Kaman Develops Copter Drone

First successful development of a drone helicopter, flown for the past eight months by Kaman Aircraft Corp., Bloomfield, Conn., was disclosed at the 10th annual forum of the American Helicopter Society in Washington.

Disclosure was made in an unscheduled showing of a short movie by Delvin E. Kendall, Jr., Kaman engineer, during a discussion of his work on automatic pilots. The drone was developed under a contract with the Office of Naval Research at a cost of about $250,000.

The aircraft has conventional Kaman intermeshing rotors. It was constructed from an HTK forward framework, with the tail section adopted from an old K225 model. It is powered by a Lycoming O4351 engine at 240 hp.

The helicopter has logged about 90 hr. of flight, all with a safety pilot in the cockpit to take over the controls in case of emergency.

The drone is operated by a pilot in a ground control station, where he has the usual collective and cyclic pitch controls. There are no rudder pedals on the ground station. Turns are made by twisting the cyclic stick handle similar to the throttle control.

Kendall said the drone is equipped with both an autopilot system and remote control link designed by Kaman.

Range of operation at the present time is limited only by the visual range of the ground operator, although it is possible that range could be extended beyond this point by tracking the helicopter with radar.

No production plans have been discussed for the drone.

Military utilization of a remote-control helicopter could include anti-submarine warfare, mine-sweeping and reconnaissance and to obtain samples of radioactive clouds.

U.S. scheduled airlines, which report expense under this item as nearly 100% of the direct operating cost. Airlines observers believe, however, that this figure may be high for a shorthaul helicopter. Some of them predict the proportion can be changed favorably if they can streamline the handling of passengers, tickets and baggage for 20-min. helicopter rides.

▶ **Engineered Economy**—Maj. Strok said improvements needed by the Army also are required by commercial operators "since both agencies are concerned essentially with a shorthaul, feederline type of machine. Any engineering improvements by manufacturers will be mutually beneficial to the two types of customers."

Recommendations made by Strok to achieve economy:

- Larger powerplants.
- Larger cargo doors and integral ramps.
- Design simplification for lower manufacturing costs.
- More plastic for structural components.
- Powerplant governors to control overspeed.
- More use of unitized component packages to speed changes.
- Standardization of nuts, bolts and gaskets.
- Easy-to-read fluid gages for oil reservoirs and transmissions.

▶ **Emergency Mission**—Role of the helicopter in the civil defense program was stressed at the society's Honors Night Dinner by Val Peterson, federal Civil Defense Administrator.

Peterson said the helicopter "can and must play a major role in our plans for the evacuation of our target cities."

Hundreds of the aircraft will be needed to keep traffic moving smoothly out of more than 190 target areas in the event of enemy attack, he said. In addition, they will be used for special rescue missions because they are the only vehicles that can reach victims without crossing contaminated areas after an atomic attack.

He said more helicopters are vital in commercial service in order to provide a pool from which they can be drawn for civilian defense purposes in case of emergency.

▶ **AHS Officers**—New AHS officers elected at the forum are John P. W. Vest of Sikorsky, president; H. Stever Tremper of Piasecki, secretary; Col. William B. Bunker, USA, treasurer.

Regional vice presidents for the next year: Jack Cherne of Sikorsky, Leon Crane of Piasecki, Herbert Moseley of American Helicopter, Lt. Cmdr. J. A. H. Torry, USN, Freidrich von Doblhoff, McDonnell, and Robert Lichten of Bell.

The three-day meeting in Washington closed with an exhibition of Army, Navy, Coast Guard and Marine helicopters.

# Comet Theory

- **British study pressure fueling as crash cause.**
- **Rome tank truck taken to England for tests.**

*(McGraw-Hill World News)*

**London**—British aeronautical experts, still trying to come up with the cause or causes of the two de Havilland Comet I crashes out of Rome, now are studying seriously a theory that pressure fueling might have had something to do with both accidents.

The theory, as now laid out, is that something may have failed in the pressure fueling system—not so much in the plane as in the tank truck which refueled the Comets prior to their takeoffs.

▶ **Ground Damage?**—Investigators are looking into the possibility that the automatic cutoff valve in the truck may not have worked properly, that the plane may have been overloaded with fuel—thus rupturing the wing tanks which are integral with the wing.

Or the pressure in the Comets' tanks may not have been released before takeoff and, with the sharp reduction in outside pressure at 28,000 ft. where the explosions occurred, the difference between inner and outer pressure may have been too great.

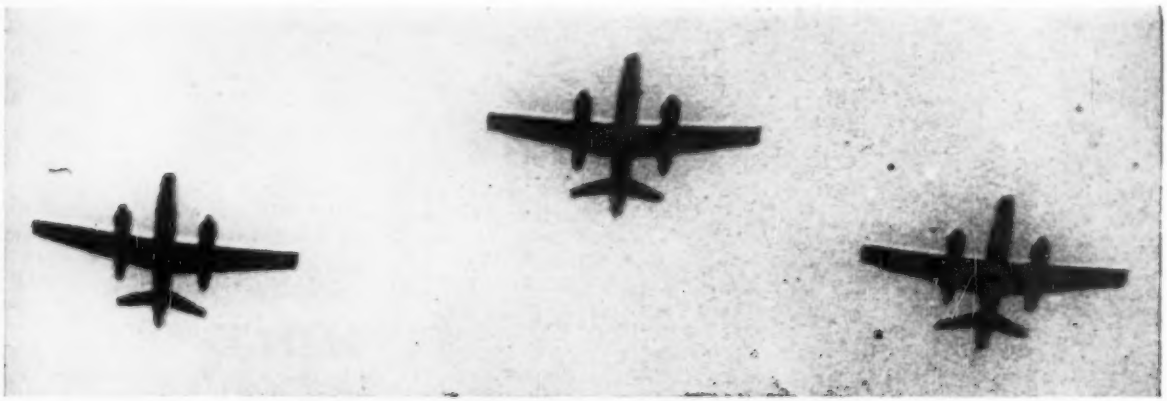
There appears to be a tendency to believe that if the pressure theory is correct any damage to the aircraft occurred on the ground before takeoff.

With this theory in mind, the tank truck used for Comet refueling at Rome recently was brought to Farnborough for exhaustive tests.

▶ **Terrific Pressure**—The theory is given some support from the fact that the only major portion not recovered from the Elba crash is the port outer wing panel. Royal Navy divers still are looking for it.

AVIATION WEEK reported earlier (May 10, p. 13) that the empennage in the Elba Comet had been subjected to a terrific downward pressure—20-30 Gs. More recent investigations confirm this. They also show other parts of the aircraft appear to have been subject to a sudden, severe rolling moment, such as might occur if a wing suddenly were lost.

One particularly intriguing feature of this possibility is it would explain the strange coincidence of sameness that characterized both the Elba and Stromboli crashes. This has led many to believe the causes could be traced to the airport, with sabotage as a possibility.



## Russian Jet Bombers in Public Display

**Trio of Il-28 light bombers roars over Moscow's Red Square during the May Day celebration. These straightwing planes designed by Sergei Ilyushin are in squadron service with the Russians and some of the satellite air forces. Axial-flow turbojets power the 72-ft.-span craft. Top speed is a little under 600 mph. Aviation Week ran complete description Mar. 30, 1953, p. 30.**

But experts who have checked every detail of the two crashes have tended to rule out sabotage.

▶ **Pinpointed Cause**—De Havilland Aircraft Co. and the Royal Aeronautical Establishment, both of which have been conducting extensive investigations into the crashes, hope to come up with a clearly pinpointed cause by summer's end.

Faulty refueling would satisfy both groups and also lift the pall hanging over Comet airliners.

When and if the causes are found, de Havilland hopes to send up a three-way fly-by at Farnborough next fall—the Comet 1, 2 and 3.

The Series 3 is nearly ready for flight, and about half a dozen Comet 2s are clear of the assembly line—mothballed now but perhaps cleared to start flight tests shortly.

## USAF Orders Quantity Of Super Connies

USAF has ordered an undisclosed quantity of Lockheed C-121C Super Constellations capable of carrying 106 passengers, 47 hospital litters or more than 15 tons of cargo on long-range overwater flights. Deliveries begin in mid-1955.

The new contract moves Super Connie production well into 1956. The Air Force C-121Cs will be powered by 3,250-hp. Wright R3350-34 Turbo Compound piston engines.

The C-121C will have a range of 2,600 mi. with full payload or a 3,570-mi. range carrying a 20,000-lb. load. Nonstop ferrying range is over 4,400 mi. Average cruise speed at maximum cruise power tops 330 mph.

▶ **C-121C Features**—The Air Force planes will include these features:

• Pressure locks for cabin doors to prevent inadvertent opening by inexperienced personnel.

• Thunderstorm lighting for instrument panels to protect the flight crew's eyes against bright flashes. Panel lights can be brightened sharply when the plane goes into storm areas to accustom the crew's vision to sudden lightning glare.

## Aircraft Industry Is Top Employer

Plane builders have passed the auto industry as the nation's largest manufacturing employer, Aircraft Industries Assn. says. AIA, quoting Bureau of Labor statistics figures for March (latest available), says aircraft firms employ more than 823,000 workers compared with 786,000 in the auto industry.

Approximately 1.9 million Americans are dependent on aircraft and parts payrolls, AIA states.

# Capital Asks Viscount Changes

**But 100 modifications are considered minor and should not delay U.S. certification by team of CAA experts.**

Capital Airlines president J. H. Carmichael was in England last week with Charles H. Murchison, CAP's general counsel, to clear up further details involved in its purchase of three Vickers Viscounts (AVIATION WEEK June 14, p. 16). Capital has an option for an additional 37 of the turboprop transports.

In Washington, D. C., meanwhile, there were these developments:

• Civil Aeronautics Administration's Viscount certification group, headed by W. H. Weeks, Aircraft Engineering Division chief, was in the midst of evaluating the data amassed on the British airliner during a three-and-a-half week trip to Europe.

• AVIATION WEEK learned Capital has requested Vickers to make more than 100 minor modifications to the Viscount for service in the U. S.

A CAP official said he expects a steady "flow of people" between Capital's Washington headquarters and Weybridge, Surrey, England, home of Vickers-Armstrongs, Ltd., between now and the time Capital takes delivery of its first Viscount—in January or February next year.

Capital will get the Model 744/D745 Viscount, basically the same as the Model 724 ordered by Trans-Canada Air Lines—except for modifications requested by the U. S. company. Vickers places a different model number on each of its contracts, according to Weeks.

▶ **Viscount Standards**—Because this transport is new to CAA experts and also contains substantial foreign equipment, it will require a thorough job of evaluation, says Weeks.

His group first must establish a set of standards for the airplane and its equipment and, when given to the British, determine if Vickers has complied. CAA will depend on Britain's Air Registration Board to determine the latter, so there will be no double checking by both government authorities.

"ARB may ask us as a courtesy gesture to come to England for the final flight tests," Weeks says, "but it will not be required on our part. Any future trips which we will undoubtedly make to England will be simply to make certain the British fully understand our conditions in certificating the airplane."

CAA is working with the British Air Registration Board rather than directly with the company. It will be CAA's job, if certification is granted, to validate the Viscount's British airworthiness certificate.

▶ **Decision Near**—Weeks expects his group will have a decision on the Viscount within three weeks. CAA administrator Fred B. Lee said recently the Viscount "did not contain any radical engineering or design problems and no difficulties are foreseen" (AVIATION WEEK June 21, p. 13).

Principal concern of the certification group is the Rolls-Royce Dart turboprop, which powers the Viscount. CAA never before has certificated a turboprop engine. Standards first must be developed by which to judge the Rolls-Royce engine. This is the job of S. H. Rolle, powerplant chief of the Engineering Division.

"Since British requirements in engine testing differ from ours," Rolle says, "we tested two engines side by side—one by American, the other by British requirements. At the completion of the test, both engines were in equally good condition, so we know from that that one isn't any tougher than the other."

Engines tested were earlier models of the Dart than the R.Da.3 turboprop now in service in the Viscount. However, Rolle says, this proves the net result is about the same. Rolle also points out that the British method of testing de-icing equipment is different from the U. S. method, so that "we have to determine if it accomplishes the same as our tests."

▶ **Spar Change**—The CAA group will

## Rocket Copter

**Successful flight of the first U. S. rocket-powered helicopters, the Rotor-Craft RH-1 and Kellett Aircraft's KH-15, was reported by the U. S. Navy last week.**

**Both aircraft are powered by small rocket units built by Reaction Motors, Inc., and installed at the rotor blade tips. The RH-1, developed by Rotor-Craft president Gilbert Magill, made its first tethered flight in 1953, the Navy said.**

**Feature of the Kellett KH-15 is a new stabilizer reported to improve greatly flight qualities and reduce vibration. The device was invented by Dr. G. J. Sissingh, chief of aerodynamics at Kellett.**

**Started by the Office of Naval Research, the projects have continued under sponsorship of the Bureau of Aeronautics. The Army's Transportation Corps also has participated in the Rotor-Craft project.**

# USAF Gets $10.9 Billion for 1955

Congress has approved $10.9 billion for the Air Force during fiscal 1955, biggest slice of the new $28.8-billion defense budget. Navy was voted $9.7 billion and Army $7.6 billion.

USAF's appropriation for fiscal 1954, which started July 1, is $272 million less than the $11.2 billion asked by the Administration and $240 million lower than the $11.1 billion appropriated for last year.

The $2.7-billion Administration request for aircraft and related procurement was approved; $13 million was eliminated from the $431-million request for research and development. The $418 million provided for USAF's R & D program is substantially below the $440 million provided for fiscal 1954.

Congress made its biggest cut in Army's budget, reducing the Administration's request by $592 million. The $7.6 billion voted Army for fiscal 1955 is more than $5.3 billion below Army's budget last year.

Details of the fiscal 1955 defense budget, as approved by Congress, are as follows:

| | Fiscal 1954 Appropriation | Fiscal 1955 Appropriation | Difference (loss indicated by parenthesis) |
|---|---|---|---|
| Air Force | $11,168 million | $10,928 million | ($240 million) |
| Aircraft and related procurement | 3,495 million | 2,760 million | (735 million) |
| Research and development | 440 million | 418 million | (22 million) |
| Navy | $9,438,310,000 | $9,713 million | $275 million |
| Aircraft and related procurement | 1,379 million | 1,974 million | 595 million |
| Army | $12,937,406,000 | $7,619,066,986 | ($5,318,339,014) |
| Office of Secretary of Defense | $13,250,000 | $12,750,000 | ($500,000) |
| Office of Public Information | 450,000 | 500,000 | 50,000 |
| Department of Defense (including funds for retired pay and other inter-service activities not itemized above) | $34,313,321,000 | $28,800,125,486 | ($5,513,195,514) |

not confirm nor deny a report circulating through the industry that the main wing spar of the Viscount has had to be changed every 7,000 hr.

"This has been a problem but we have no 7,000 hr. figure," Weeks says. "Problem is that the Viscount has a single wing spar. Vickers has assured us they are continuing their fatigue tests on the main spar.

"We do not expect this to hold up certification."

Viscounts also have lost baggage doors on the right lower side. As far as the certification group can determine, this problem has been solved by the addition of new fittings to tighten the door. This door opens outward. Several have been lost in flight by British European Airways.

►**TCA Changes** – Modifications required by Trans-Canada before buying the Viscount have been a great help to the U. S. certification team.

TCA required bigger windshields to improve cockpit visibility, an important point for U. S. airline operators. The Canadian airline also demanded a rearrangement of controls and equipment in the cockpit to conform to North American standards that will be adopted for Capital's use.

Operationally, there seems to be no major problems, according to R. B. Maloy, of CAA's Engineering Division flight test branch. Maloy made five flights in the Viscount, both at Vickers Weybridge works and aboard a BEA Viscount from London to Frankfurt, Germany. He is enthusiastic about the handling characteristics and believes U. S. pilots will enjoy flying the Viscount.

"One thing we must determine now," Maloy points out, "is whether or not a flight engineer will be required for operation in this country."

He doubts one will be required after all the mass of data has been digested, but it is a possibility.

►**Special Conditions**–When the CAA group completes its study of the Viscount in the next few weeks, it will inform the British ARB of the specific standards and additional requirements the airplane must achieve before it can be granted U. S. certification.

Under this country's bi-lateral agreement with Great Britain, each participant has the right to establish special conditions necessary to achieve the same level of airworthiness on the other's aircraft.

Modifications Capital has requested range from installing an illuminated Return-to-Seat sign to revision of propeller and cowl de-icer circuits. Included are:

- Remove the window at the radio operator's station.
- Provide for visual inspection of the main-door locking mechanism.
- Install door seals of improved winterized material.
- Improve the nose-wheel door mechanism.
- Improve fuselage soundproofing.
- Install seat mounting tracks in the cabin.
- Provide for emergency exits at only six windows. All of the Viscount elliptical windows are emergency exits in the British version and open inward.
- Install a one-piece door between the cabin and the flight compartment, hinged on the right side and swinging forward.
- Redesign the water system.
- Install webs at the cargo doors.
- Relocate hand-brake control to the control pedestal.
- Provide for external undercarriage ground locks.
- Provide brakes for nose wheels when they are in the up position.
- Protect undercarriage downlock position against icing and mechanical damage.
- Install solid-blade Rotol propellers.
- Develop de-icing heater system for engine fuel filters.
- Replace the British Sperry Gyrosyn with the U. S. Sperry type.
- Replace British flight instruments with American types.
- Remove the synchroscope.
- Revise hydraulic system to provide for pump bypass system to unload pump in flight.
- Install hydraulic pumps on inboard powerplants.
- Install standard North American navigation lights.
- Install Grimes landing lights.
- Revise cockpit lighting and improve cabin night-lighting.
- Revise wing de-icer heat-exchanger air scoop to prevent water collection.
- Install third windshield wiper.
- Install power-operated entrance doors.

Once the airplane is certificated and delivered to Capital, it will be subject to the standard U. S. proving flight check of 100 hr., at least 50 of which must be flown over Capital's routes and 10 hr. at night.

## Modifications Boost Super Connie Speed

Trans World Airlines Lockheed 1049 Super Constellations will gain approximately 12 mph. under long-range cruising conditions at 20,000 ft. at 107,000 lb. airframe weight as a result of a six-month joint study by TWA and Lockheed Aircraft Corp.

The program was initiated to enhance the Super Connies' speed on long flights and edge it closer to the faster, competitive Douglas DC-7 being used coast to coast by American Airlines and United Air Lines.

Approximately two months ago TWA leased one of its 1049s to Lockheed for the speed modifications. Tests have been completed which show that the 1049 performance has increased as a result of these changes:

- Engine nacelles extended.
- Wing-fuselage fillets elongated.
- Propeller spinners extended rearwards, with their afterbodies fixed to the engine nose cases. This increases airflow over the engine nacelle and cuts air spillage around the cowlings. Airflow through the engines also is lessened, improving cooling, according to Trans World.
- Cowlings fattened and cowl flaps lengthened two inches, also reducing drag.
- Cabin air cooling air handling method revised. One of three wing apertures has been closed and the size of one intake was reduced by one-third. One aperture was untouched.
- More efficient wing refrigerator bay kits installed.
- Wing walkway paint removed.

## Jackson, McClellan Get Key Senate Posts

Sen. Henry Jackson has been appointed to the Armed Services Committee and Sen. John McClellan to the Interstate and Foreign Commerce Committee. They fill Democratic vacancies caused by the death of Sen. Lester Hunt.

Last year Jackson supported efforts, led by Sen. Stuart Symington, to obtain more funds for the Air Force after the new Administration cut $5 billion from USAF's budget. Before the Korean war, he voted for funds for the 70-group USAF program over the opposition of the Truman Administration.

In Senate action on legislation separating airmail payments from subsidies in 1951, McClellan supported the scheduled airline position. He voted against making all-freight airlines eligible for subsidy, was for a high service mail rate for international air carriers and long-term airmail contracts.

**ROCKET COMPETITION** pitted NAA F-86D (above) against Lockheed Starfire. F-94C won.

# Crew TAF Wins Rocket Meet

**Yuma, Ariz.**—Crew Training Air Force gave Air Training Command a clean sweep of USAF championships as its F-94C Starfire crews won the first air-to-air rocket meet with a mark of 431% "kills."

Only the week before, ATRC won the all-jet fighter gunnery and weapons meet at Las Vegas with 3,153 points out of a possible 5,600 in air-to-air and air-to-ground firing.

Crew TAF scored 10,400 points out of a possible 24,000 to win the rocket meet at this desert base.

▶ **F-86D vs. F-94C**—High number of kills scored in the meet by F-94Cs and F-86Ds using Hughes fire control systems caused at least one Pentagon observer to comment that the entire rocket firing program could move at least nine months ahead of schedule as a result of the meet.

Although the two-man Starfires walked off with top honors, taking both first and second place, the debate over the merits of two-place vs. single-seat all-weather interceptors remained unsettled.

Champions of the single-place F-86Ds pointed out that relative merits of the crews had as much to do with the outcome as the type of aircraft. At least one officer firing in F-86Ds had no previous rocket firing experience in the type of plane in which he competed. Such factors, it was said, made it impossible to judge accurately the merits of the two aircraft.

"Sour grapes," was the terse comment of a Starfire champion to these arguments.

Although a demonstration team of F-89D Scorpions was on hand, the Northrop interceptors did not compete.

▶ **200-Mph. Target**—North American B-45s towed targets with 6,000 ft. of cable at a speed of 200 mph., a speed some observers criticized as too slow for the interceptors.

The interceptors were "scrambled" and vectored to their targets by ground control officers who were members of the competing teams. A chase plane accompanied each interceptor to make certain its radar was locked on the target and not on the tow ship.

In addition to Crew TAF, other teams were: Eastern Air Defense Force (F-86Ds); Western Air Defense Force (F-94Cs), and Central Air Defense Force (F-86Ds).

Team scoring: Crew TAF, 10,400; WADF, 6,800; EADF, 5,800; CADF, 2,000.

## Douglas Scores U.S. Defense by Retaliation

**Los Angeles**—The U.S. long-range atomic striking force no longer is sufficient for defense needs—if it ever was, Donald W. Douglas, president of the Douglas Aircraft Co., told the summer session of the Institute of the Aeronautical Sciences.

"We must in addition have forces designed to counter all grades of disturbance, from infiltration and civil rioting through minor aggressions up to major aggressions and total war," he warned in what some regarded as a criticism of the Administration's "new look" military policy.

The "means of our own choosing" must be suitable to the occasion and of such a nature that the enemy believes we will actually employ them against him if he makes a move, the aircraft industry leader told members of the institute.

▶ **First Blow**—But it is not safe to plan any defense on the basis of something that will be built after hostilities start, Douglas warned. The forces with which the U.S. will strike back must be in existence and in readiness at all times.

"Moreover, they must be able to strike back after they have sustained the first blow," he said, "for one of the rules of the game—which is at the same time our weakness and our

strength—is that we grant the enemy the first blow."

Therefore, the U. S. cannot afford to spend money developing standby production facilities until our retaliatory forces and their defenses are unquestionably adequate, Douglas said.

"Yet this concept, which we found so valuable in the last two wars, dies hard."

Douglas delivered the key address at the IAS banquet June 23.

▶**Massive Retaliation**—In his plea for military forces that can meet all types of disturbances, Douglas said:

"Given the enemy's ability to launch massive retaliation against us, it is inconceivable that we would permit our atomic striking force to be used to counter any aggression which did not constitute an immediate mortal threat to our continued life as a free nation.

"Our atomic striking force is just as essential as ever, but it is no longer sufficient for our defense needs, if ever it was."

▶**Mobile Reserve**—It is quite evident that the U. S. cannot afford to have forces permanently stationed all over the world, covering all spots where trouble might break out, he said. Nor, with the speed inherent in modern air transportation, is this necessary.

"A large part of our day-to-day forces can be maintained in the form of a mobile reserve, to be shifted where needed at a moment's notice."

Douglas said a worldwide system of air transportation in continuous peacetime use in the interests of commercial trade and travel would be of great assistance in doing this.

"Such a system is now in operation," he said, "but much can be done to expand it and to integrate its operations and facilities with those of our military air transport system. To the extent that one complements the other, the total cost will be reduced and the effectiveness in maintaining peace will be greater."

## Management Group Takes Over Hughes

**Culver City, Calif.**—Executive committee of the Hughes Aircraft Co. took over management of the avionics firm last week after official announcement of the resignation of William C. Jordan as general manager and executive vice president (AVIATION WEEK June 28, p. 14).

This "management by committee" has considered an interim step until Howard Hughes could find a new general manager to replace Jordan.

▶**Temporary Job?**—Hughes employes were informed in a company bulletin that Jordan was resigning to prepare for a surgical operation, now scheduled within the next month.

His appointment to replace Gen. Harold L. George after a management shakeup last year had been only temporary, in any event, the announcement said.

▶**New Management**—The executive committee, which now will take over management of the firm consists of:

Howard Hughes, president; R. J. Shank, vice president and director of research and development-radar; Nathan I. Hall, vice president and director of research and development-missile division; Raymond B. Parkhurst, vice president and plant manager-electronic manufacturing, and W. W. Woolridge, vice president and plant manager-missile manufacturing.

## New York Studies Three Heliport Sites

Three heliport sites are under consideration by the Marine and Aviation Department of New York City to serve the Manhattan area.

Two of the helicopter landing areas will be on the Hudson River, one on East River. All will be atop city-owned waterfront terminals, but MAD is not ready yet to announce exact locations.

The heliports would be used by the two copter airlines now serving the New York area—New York Airways and Mohawk Airlines.

A study by the Port of New York Authority one and a half years ago predicted that 300,000 passengers would be using metropolitan commuter helicopter service by 1955 (AVIATION WEEK Dec. 8, 1952, p. 87).

The study found that six heliports would be needed—three in Manhattan, others in Brooklyn, Newark and Staten Island.

Present New York heliport planning projects only to 20-passenger copters.

## NACA Opens New $3.8-Million Facility

**Edwards AFB, Calif.**—National Advisory Committee for Aeronautics officially opened its new multi-million-dollar, highspeed flight research facility on this desert test base last week.

The $3.8-million building contains the latest in instrumentation, data reduction, flight and maintenance facilities. The modern air-conditioned three-story structure is one of the first buildings completed under the Edwards Base master plan.

NACA operates its facility as a "tenant" on the Air Research and Development Command base.

The highspeed research station, formerly a division of NACA's Langley Field Aeronautical Laboratory, also becomes an autonomous unit of the committee with the opening of the new facility.

Among those present for the dedication ceremonies: Assistant Secretary of Air Roger Lewis; Gen. Edwin Rawlings, chief of the Air Materiel Command; Lt. Gen. Thomas S. Power, ARDC commander, and Dr. Hugh L. Dryden, NACA director.

Chief of the highspeed flight station is Walter C. Williams.

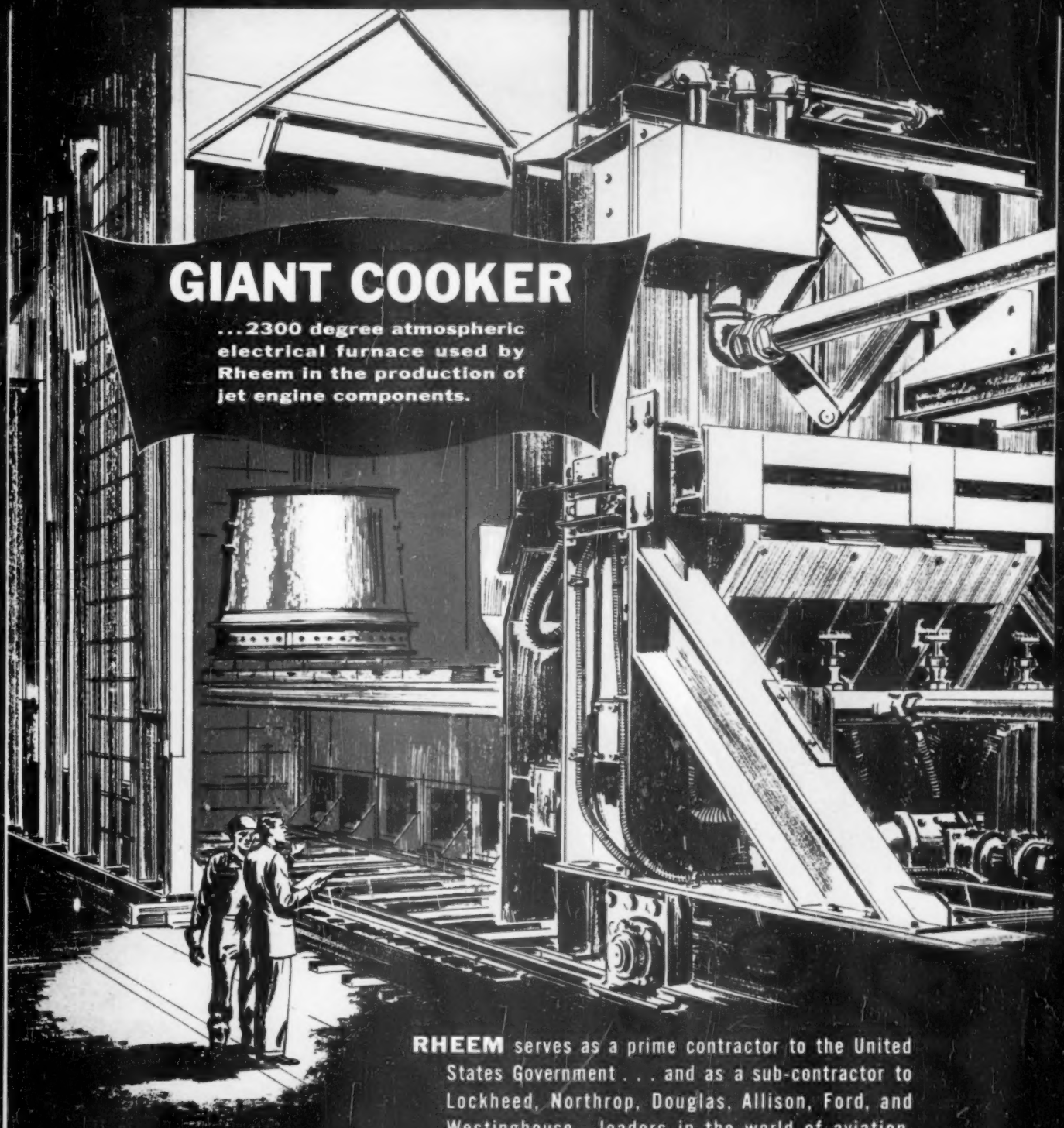
**Lockheed Rolls Out First P2V-7**

**Here is the first production Lockheed P2V-7 Neptune anti-sub aircraft, minelayer or torpedo plane, minus the two Westinghouse J34 jet units that this series will carry in pods—one beneath each wing for added power when needed (Aviation Week Feb. 8, p. 9). The canopy is higher to improve pilots' visibility. The elongated "stinger" tail houses detection devices. Powerplants are R3350 Turbo Compounds.**

## TWA Sets Records

June may have been a record month for Trans World Airlines in passenger mileage. The airline reported:

- A 15.4% gain in domestic traffic for the first 20 days of June.
- Revenue passenger-miles on domestic routes for the week ending June 20 set a new record for any seven-day period in the company's history.
- Internationally, TWA set a new single-day loading record June 22 when 414 passengers boarded trans-Atlantic flights at New York and Boston.
- TWA's New York station reported heaviest weekend traffic this year, with June 19 establishing a new single-day boarding high of 2,244 passengers.



# GIANT COOKER

**...2300 degree atmospheric electrical furnace used by Rheem in the production of jet engine components.**

**RHEEM** serves as a prime contractor to the United States Government . . . and as a sub-contractor to Lockheed, Northrop, Douglas, Allison, Ford, and Westinghouse — leaders in the world of aviation.

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AIRCRAFT DIVISION

**RHEEM Manufacturing Company . . . Aircraft Division, Downey, California**

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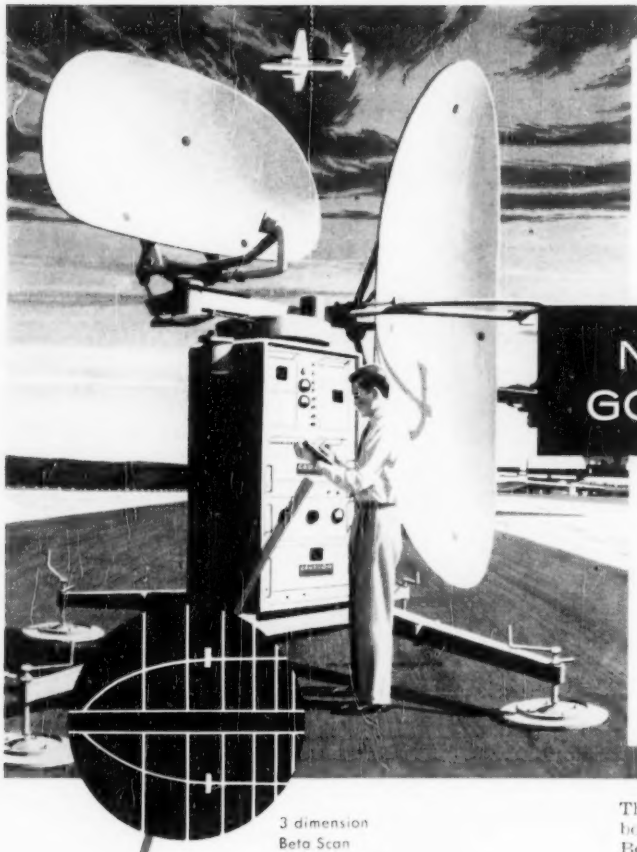

Now, complete, low-cost radar traffic control is available for small and medium-size civil airports, and for military emergency air strips.

# NEW GILFILLAN GCA QUADRADAR

WORLD'S FIRST 4-IN-ONE RADAR
Final approach, and surveillance, and height-finding, and airport taxi—in a single 2000-lb. one-scope equipment at 1/6 the cost of GCA radar.

The Gilfillan GCA Quadradar has full 30° sector scan of both elevation and azimuth beams on the new Gilfillan Beta Scan Azel Indicator. It also has electrical rotation of both antennas through 360° (from operator's position), providing multiple runway coverage and safe landings of all aircraft and helicopters from any angle.

A turn of the switch changes the indicator display **IN LESS THAN 5 SECONDS** from surveillance to final approach. In another 5 seconds, the operator can change to airport taxi control or to height-finder display. This rapid selection gives the radar operator instant, accurate data on all aircraft in 3 dimensions for the first time in aviation history.

The new Gilfillan GCA Quadradar meets all International Civil Aviation Organization standards for GCA equipment. It meets rigid military and civil aviation GCA standards for accuracy and dependability.

**WRITE FOR BROCHURE—SPECIFY:**
Gilfillan GCA Quadradar-M (Military Equipment)
Gilfillan GCA Quadradar-C (Civil Airport)

*Gilfillan*

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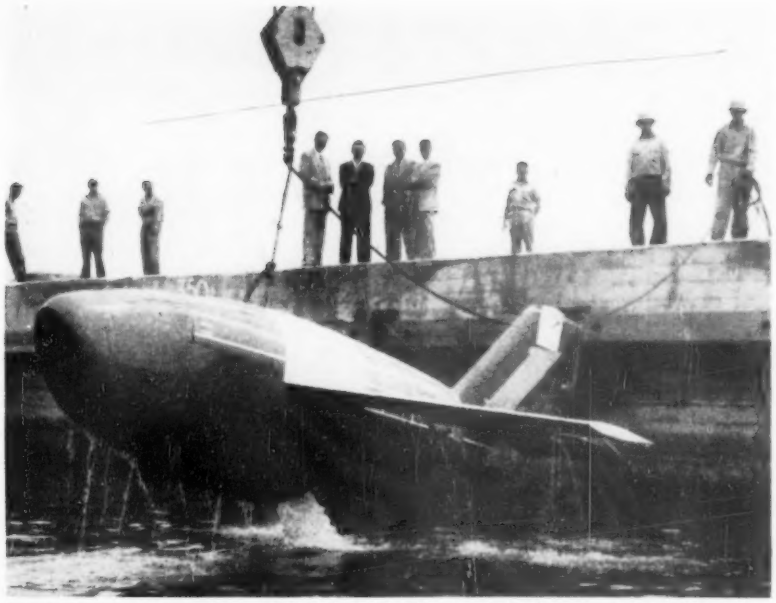


**SPEWING SALT WATER,** modified Ryan Firebee is regained after one-hour immersion.

**INTO THE WATER** goes a Ryan XQ-2 at 20-ft./sec. rate to test flotation capability.

**FIREBEE FLOATS** beneath slack cables during salt water trials. Note clock on tail.

# Ryan Tests Firebee for Fleet Use

First details of how Ryan Aeronautical Corp. has modified a Firebee jet-powered target drone to meet Navy fleet operational requirements have been revealed following first trials at the Naval Air Missile Test Center, Pt. Mugu, Calif.

Navy has ordered an undisclosed quantity of the small "birds," designated KDA-1, to be used as near-sonic aerial targets.

To provide recoverability and re-use after missions, Navy specified that the Firebee remain afloat one hour with a 25% fuel load. Ryan engineers established a goal of one-hour flotation at 50% fuel condition. Some way had to be found to build this required buoyancy into the KDA-1, since previous customers—the Air Force and Army—had established no such requirement.

▶**How They Did It**—A preliminary study of the Firebee showed that approximately 500-lb. of additional buoyancy would be necessary. Ryan engineers decided the most efficient method was to install foamed-in-place plastic flotation material in the wings, horizontal stabilizer and nacelle. The electronic equipment compartment was sealed off in order to prevent the entrance of water.

An Air Force Ryan XQ-2 was modified for the tests. Preparation included marking major design waterlines and station lines and installing a manually operated time indicator on the vertical stabilizer.

▶**Water Trials**—The Firebee, with a Fairchild J44 turbojet installed, was ballasted at the 50% fuel condition. A sling was attached so that the drone hung at the normal 10-deg. tail-down attitude of a parachute descent.

The drone was dropped into the sea from a height of six feet, producing a 20-ft./sec. descent. Wings and horizontal stabilizer reduced entry into the water considerably. During its one-hour stay in the water, the XQ-2 nose settled slightly, dropping from a two- to a five-deg. attitude.

After removal from the water the drone was rinsed thoroughly to prevent corrosion.

In subsequent tests, the Firebee was ballasted at 25%, then at 90% fuel load condition. After the latter trial, the target was allowed to stand in the Ryan plant for 24 hr. before fresh water rinsing. In the next 30 days it was checked for effect of its salt water trials.

▶**Flight Trials**—Test results indicate that the modified Firebee will more than meet the Ryan requirement for flotation for one-hour at 50% fuel load.

Ryan since has modified an additional five Air Force Q-2s and delivered them to Pt. Mugu Naval Air Missile Test Center for flight trials under a Phase A program that will evaluate the target plane's remote control equipment, performance, flotation and other requirements.

The Firebee then will go into Phase B where it will be tested for suitability in actual fleet operations.

## New ADC Base Sites

Four new sites for Air Defense Command bases have been selected by the Air Force. All are in the north central states.

The sites are: Traverse City-Benzie County, approximately 20 mi. southwest of Traverse City, Mich.; Fargo-Grand Forks, approximately 10-15 mi. northwest of Grand Forks, N. D.; Bismarck-Minot, 10-15 mi. northwest of Minot, N. D., and Glasgow-Miles City, approximately 15 mi. north of Glasgow, Mont.

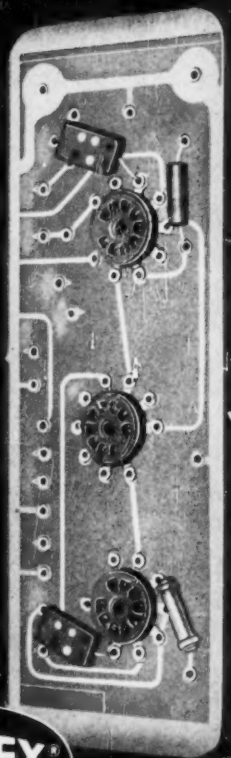
**At last!**
**Printed Circuit**
**Tube Sockets that**

# —withstand punishing shock and vibration

**made of**
**MYCALEX® 410**
**glass-bonded mica**

- LOSS FACTOR .014 at 1 mc/s
- POWER FACTOR .0015 at 1 mc/s
- HIGH DIELECTRIC STRENGTH
- NO CARBONIZATION
- ZERO COLD FLOW
- IMMUNE TO FUNGUS

MYCALEX printed circuit tube sockets effectively eliminate broken or loose connections that ordinarily result from tube insertion and removal, shock and vibration. An exclusive MYCALEX contact design permits a positive mechanical attachment in conjunction with a soldered connection. The mechanical attachment safeguards against stress at all times, insures the permanence of the soldered connection between printed circuit and socket contact. Troublesome intermittent contacts, costly repairs are thus eliminated.



Application of these sockets to your printed circuit can speed production, reduce rejects, improve performance. For information call or write J. H. DuBois, Vice President-Engineering, at Clifton, N. J., address below.

NOTE: MYCALEX 410 glass-bonded mica is an exclusive formulation of and manufactured only by the Mycalex Corporation of America. It meets all the requirements for Grade L-4B under Joint Army-Navy Specifications JAN-I-10.

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## Combat Wings

The following table is the latest revision of USAF's expansion timetable to reach its ultimate goal of 137 combat wings:

| Date | Wings |
|---|---|
| June 30, 1953 | 106 |
| June 30, 1954 | 115 |
| June 30, 1955 | 121 |
| June 30, 1956 | 127 |
| June 30, 1957 | 137 |

## Taca Wins Renewal Of U.S. Route Rights

Taca International Airlines, S. A., last week received a three-year foreign air carrier permit from Civil Aeronautics Board to continue its Central American operation of flights running between El Salvador and New Orleans, La.

CAB granted the airline's request to operate between San Salvador, El Salvador, Guatemala City, Guatemala, Belize, British Honduras and New Orleans. Since Mar. 30, 1952 when its former permit expired Taca has been authorized to continue its operations pending the Board's decision.

In granting the permit, CAB noted that Taca is the only airline available to El Salvador for a reciprocal route to the U. S. Awarding the permit will preserve the interests of El Salvador, the Board says, since there is no indication that sufficient capital is available in that country for promotion at the present time.

## Gluhareff, Navy Win Top Copter Awards

Michael Gluhareff, Russian-born chief engineer for the Sikorsky Division of United Aircraft Corp. and pioneer aircraft designer, was presented the Dr. Alexander Klemin award at the 1954 Honors Night Dinner of the American Helicopter Society in Washington, D. C.

The society's second major prize, the Capt. William J. Kossler Award, was given to the United States Navy in recognition of its progress using helicopters in anti-submarine warfare. It was accepted for the Navy by Rear Adm. Clarence E. Ekstrom, commander of a carrier division, who has been active in the utilization of rotary-wing aircraft for this purpose.

► **Fellowships**—Two AHS fellowships also were awarded at the society's 10th annual forum. Honored in this ceremony were Floyd W. Carson, chief test

# SEVEN-LEAGUE BOOTS FOR A BOMBER

B-47 Cockpit Canopies also by Goodyear Aircraft

THE combination of high-speed flying and a far-off target calls for a large fuel supply – especially when the plane is a B-47 with six jet engines to feed.

Because of its long experience, Goodyear Aircraft was asked to help give this giant bomber extra fuel capacity.

Pictured above is the result: precision-built all-metal auxiliary tanks which can be rigged under the plane's wings, jettisoned when empty.

The success of these tanks is due in a large measure to special metal-working skills and welding techniques developed at Goodyear Aircraft. They are lighter – require no liner – are inherently "fuel-proof," able to withstand the vibrations and sloshing encountered in aerial transportation of bulk fuel.

As a result, the Boeing B-47 can not only fly faster than any other operational bomber in the world, but it can fly far – *ominously far* – a fact any potential enemy must weigh well!

*Goodyear Aircraft Corporation is a major supplier of a wide range of aircraft components, including fuselage shells, cockpit enclosures, radomes, electronic equipment, and a weight-saving structural material called* Bondolite. *For more information on the facilities and services of this versatile, 13,000-man organization, we invite you to write:*

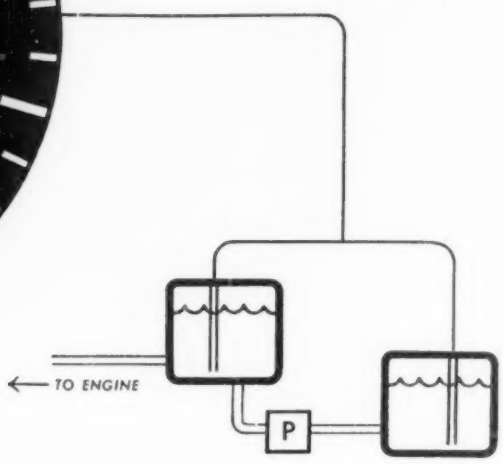
*Goodyear Aircraft Corporation*
*Department 931AS, Akron 15, Ohio*
*or Litchfield Park, Arizona.*

**Metal Fuel Tanks by**

# GOODYEAR AIRCRAFT

☆ THE TEAM TO TEAM WITH in AERONAUTICS ☆

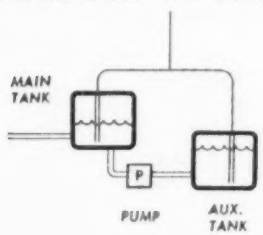
Bondolite–T. M. Goodyear Aircraft Corporation, Akron 15, Ohio




NORMAL

# Have you heard about AVIEN'S "LIE DETECTOR"?

In a certain new Douglas airplane the pilot flies over 750 miles an hour. He must know at a glance how much fuel he has. But if the gage merely showed total fuel, it could "lie." This Avien system registers only *engine - available* fuel.




EMERGENCY

Thus, if the auxiliary tank stops feeding the main tank, the useless contents are automatically dropped from the indicator total.

Avien has built this "lie detecting" function into its Two-Unit Fuel Gage by the simple addition of a level switch—*as an integral part of the Fuel Gage tank unit.* Note that this added function has been accomplished without added components.

Avien has solved such problems for more than 50 different types of aircraft. Essentially, Avien "tailor-makes" each gaging system to meet specific needs, with the same care and skill that went into the original design of the now widely used line of Avien gages.

Maintenance and installation are simplified to "plug-in, plug-out." Precalibration eliminates the cost and risks of field calibration.

Every month, over ten thousand major instrument components for the aviation industry are being produced by Avien.

If you have a gaging problem – fuel, temperature, thrust or otherwise – call on us.

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AIRCRAFT AND INDUSTRIAL INSTRUMENTATION

pilot of Bell Aircraft Corp.'s Helicopter Division, and Ferdinand Moran, an examiner for the Civil Aeronautics Board.

Carlson was cited for his influence in the design and development of Bell helicopters. Moran presided over hearings that led to the granting of certificates for the three scheduled helicopter airlines now operating in Los Angeles, Chicago and New York.

▶ **'Notable Achievement'**—The Klemin award, established by Frank N. Piasecki, board chairman of Piasecki Helicopter Corp., is presented each year "for notable achievement in the advancement of rotary-wing aeronautics."

In awarding it to Gluhareff, the society honored him as the chief designer of all Sikorsky aircraft since 1924, including amphibians and flying boats as well as helicopters.

The society's award citation said his most outstanding contribution has been the design and production development of all-metal interchangeable blades.

The Kossler Award, created by AHS to honor a pioneer Coast Guard helicopter pilot, is presented annually "for greatest achievement in practical application or operation of rotary-wing aircraft, the value of which has been demonstrated in actual service during the preceding year."

Navy won the award for advances made in 1953 toward adopting the helicopter to the point where it is near "full-fledged partnership in fleet antisubmarine forces."

## Mexico Bans English On Airport P.A. System

*(McGraw-Hill World News)*

**Mexico City**—Mexico's Civil Aeronautics Department has ruled that only Spanish may be used over the loudspeaker system at Mexico City's new $4.5-million airlines terminal building, creating considerable confusion among foreign passengers.

Practically none of the 140,000 English-speaking airline passengers passing through this city understand the language well enough to know when their flight departure times are being announced.

The government has announced no reason for its ruling at the new terminal. Airlines point out that in San Antonio and Dallas, Tex., and even New York, all announcements are made in English and Spanish.

Pan American World Airways and American airlines operate into Mexico City Airport.

The new terminal, opened recently after a one-year delay, is said to be capable of handling 24 Douglas DC-7s simultaneously.

**BRISTOL 171** trio flies at 500 ft., new U. K. minimum designed to aid copter expansion.

# Helicopters Gain Favor in Britain

### New BEA shuttle is expected to touch off commercial buildup, as airline shops for big rotary-wing transport.

*(McGraw-Hill World News)*

**London**—British airlines will make a big and rapid expansion of helicopter passenger service on domestic routes and to and from nearby cities in Europe, industry observers here forecast.

Inauguration by British European Airways of Southampton to London Airport copter service last month appears to have been the first link in a rapid chain of events designed to bring the copter into its own here as a commercial passenger and airfreight carrier (AVIATION WEEK June 21, p. 17).

▶ **500-ft. Ceiling**—Almost immediately after BEA's Bristol 171 helicopter landed at London Airport on its first regularly scheduled flight from Southampton, authorities lifted restrictions on helicopters flying over London. Previously they could not fly lower than 1,000 ft.

Although the 1,000-ft. restriction still applies to the heart of the city, 500 ft. is the minimum over many wide areas, and both commercial and military helicopters are free to come and go from the south bank of the Thames right in London.

▶ **S-55 Services**—BEA apparently anticipated this action, because it already has ordered two Sikorsky S-55s for delivery this fall. Upon receipt BEA immediately will fly them 100 hr. for their certificate of airworthiness tests.

In November, regular scheduled services will be started between the south bank and London Airport, although only freight will be carried at first. This will be a trial period in which to prove the operation is practical.

In March of next year, passenger flights are to be started at a rate of $4.20 per person—the cost of hiring a private car from downtown London to the airfield. This is the same price, incidentally, now being charged for the London-Southampton flight. BEA admits this latter service is a losing proposition, but publicity and experience gained are considered worth it.

▶ **U. K.-Built S-56?**—What BEA actually wants are bigger helicopters. It has in mind the S-56, if nothing better comes along meanwhile.

There is every indication Westland Aircraft, Ltd., plans to ask Sikorsky for a license to manufacture the S-56 in Britain and install British gas turbine engines in it. Westland already is producing S-51s under licence.

BEA considers the ideal passenger helicopter must be twin engined, twin rotored, and capable of sustaining level flight fully loaded with one unit out. So far no helicopter satisfactorily meets these requirements.

▶ **Copter Target**—Britain, and West Europe probably have a singular advantage over other areas of the world for the development of helicopter passenger services. The high density of population means there are many metropolitan areas too far apart for quick and easy automobile travel, particularly in Britain where the roads are bad.

The target of the helicopter necessarily must be to become competitive with other forms of public transport in these areas. Where it cannot meet competition in price, it must compensate with more convenience and greater speed.

It is interesting to note that a heliport requires less space than the average railway station. One possibility is that air travel through centrally located 'copter commuters ultimately could become more accessible than train stations, thus reversing the present situation.

If an enemy strikes . . . 80,000 fiery horses thrust 175 tons of fighting fortress screaming up to a service ceiling of more than 40,000 feet. Then the rough-tough-and-ready Boeing B-52 Stratofortress levels off and blasts ahead . . . America's flying giant rushing to retaliate deep behind any aggressor frontier.

This mighty "battle-wagon" of the Strategic Air Command packs over 350,000 pounds of fighting strength into 156 feet of fuselage and 185 feet of wingspan. Naturally, this super-plane needs superior components and materials to withstand the stresses of stratosphere flight. That's why Boeing specifies numerous aluminum forgings by Consolidated — forgings with the great strength, light weight, durability, and corrosion resistance so vital at critical locations on the Stratofortress.

If you also have requirements for quality forgings, quickly and accurately produced to your exact specifications . . . if you have a problem that can be solved by the use of Consolidated aluminum, titanium, or alloy steel forgings, do as America's leading jet engine and aircraft manufacturers are doing, get in touch with us.

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## Air Industry Spends $8,213 for Lobbying

Reports filed under the Congressional Lobbying Registration Act show modest expenditures totaling $8,213 by aviation firms during the first quarter of 1954 for legislative activities.

Compared with expenditures reported by Association of American Railroads totaling $56,832, three representatives of Air Transport Assn. reported expenditures of only $541. They were: Edward Rogers, $470; Stanley Gewirtz, $38; Stuart Tipton, $33.

They also reported these receipts during the period: Rogers, $1,250; Tipton, $1,742, Gewirtz, none listed.

Four other airline representatives listed these expenditures and receipts:

- **Pan American World Airways:** John Cone, no expenditures or receipts listed.
- **American Airlines:** Dwight Taylor, expenditures of $317 and receipts of $2,875.
- **Trans World Airlines:** William Huff, expenditures of $244 and receipts of $2,319.
- **Conference of Local Airlines:** Donald Nyrop, expenditures of $308 and receipts of $308.

Aircraft Industries Assn. reported first quarter expenditures for legislative activities totaling $4,768 and receipts of $4,768. In addition, four individual AIA representatives filed reports: Harold Mosier, expenditures of $880 and receipts of $3,750; De Witt Ramsey, Harry Brashear, and Avery McBee reported no expenditures and no receipts.

Vernon Johnson, representing Lockheed Aircraft Corp., reported expenditures of $1,155 and receipts of $4,500.

Larry Cates, representing Air Line Pilots Assn., listed no expenditures and reported receipts of $2,800.

Wayne Weishaar, representing Aeronautical Training Society, reported no expenditures or receipts.

## Survey Forecasts Big Spray Plane Future

There will be 10,000 agricultural airplanes in operation in the U. S. eventually, with replacements running some 500 to 700 aircraft yearly, the American Chemical Society, Washington, D. C., predicts.

This phase of aviation has grown to a $45-million business and third only in flying hours to the airlines and business aircraft, according to the Society. Piper is credited with presently enjoying the "lion's share" of the market.

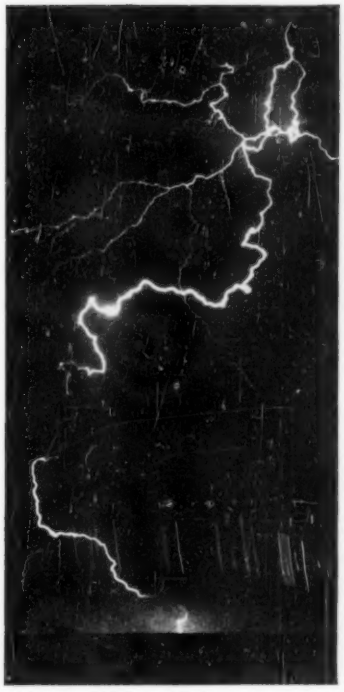
A survey of agricultural flying is contained in the Society's June publication, Journal of Agricultural and Food Chemistry.

# FLY WEATHER-WISE

*These weather items prepared in consultation with the United States Weather Bureau*

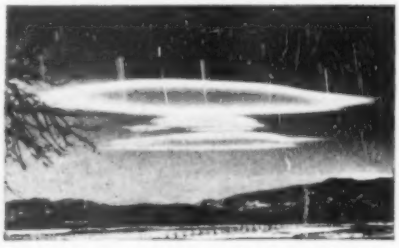
UNITED AIR LINES PHOTO

**Scattered clouds** common to fair weather indicate an unstable layer of air. For smoother flying avoid this bumpy area by flying above the cloud tops or below the level of the cloud bases.



**Unlike** squall line thunderstorms, the common "nocturnal" thunderstorm which forms in late evening over Mid-western U.S.A. has a high base, and smooth flight is often possible in the clear at about 4,000 feet.

**Be prepared** for hail in early stages of afternoon thunderstorms at about the time of first lightning. Hail falls in narrow shafts often outside the parent cloud (CB). Note hail pattern on ground in above picture.



**Flying down valleys** avoid leeward sides when winds are blowing strong across the ridges. The down-slope currents are often more turbulent—harder to keep altitude—than the up-slope currents on the windward side.

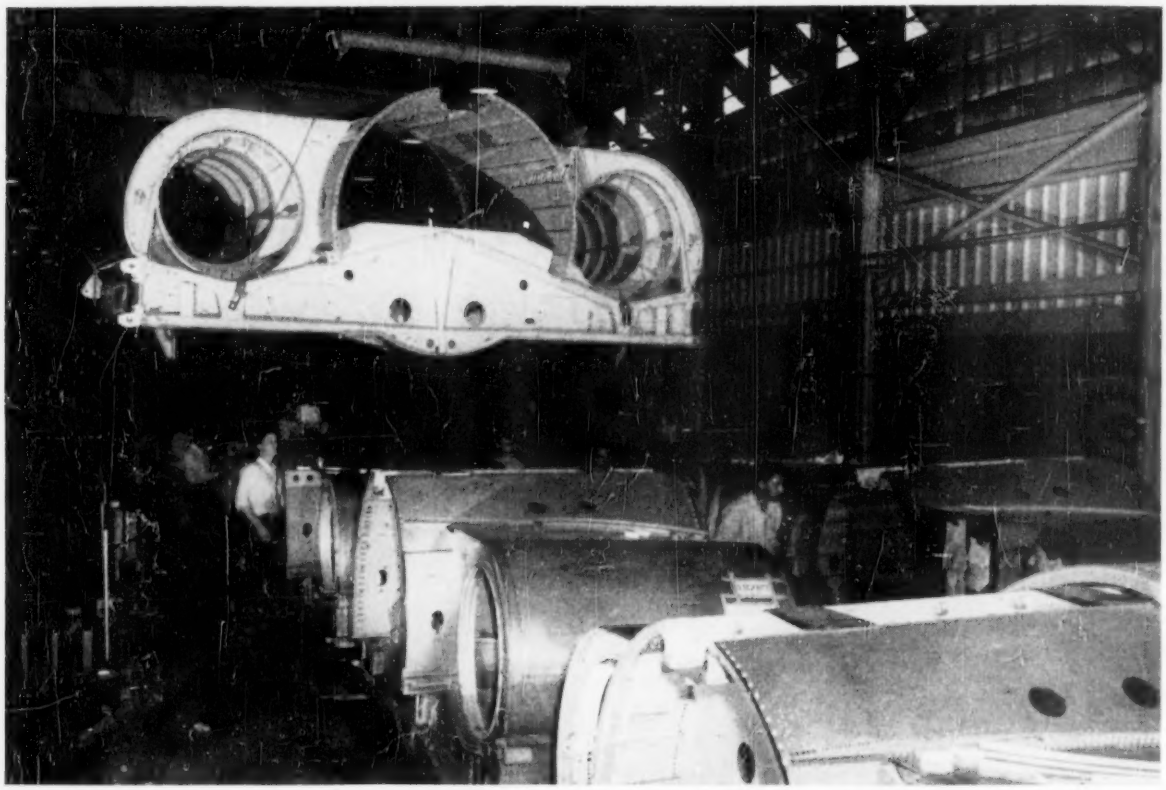

# Best Pair to Get You There

SUMMER HAIL, thunderstorms, turbulence — call for good judgment and flying skill. But the right aviation products are also essentials to flight safety. Good reason experienced pilots insist on Mobilgas Aircraft and Mobiloil Aero. They are the products that flew with Lindbergh...Admiral Byrd...Wiley Post —a host of other air pioneers. And today these continually improved Flying Red Horse fuels and lubricants are still first choice for top engine performance. Fly safely...fly with the Flying Red Horse!

Mobiloil AERO

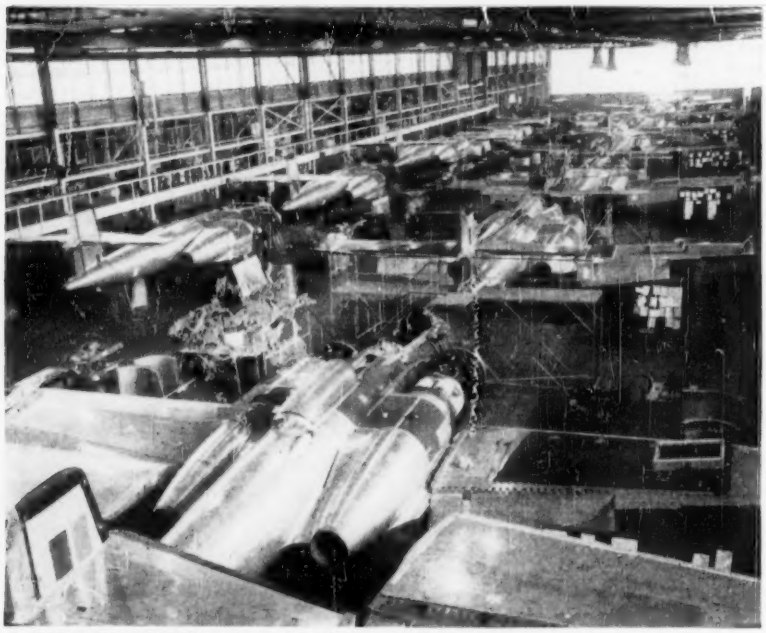
Mobilgas AIRCRAFT

SOCONY-VACUUM OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.



**CENTER SECTION** for CF-100 is transported to mating station. Nacelles for Orenda jets are at ends of carry-through structure.

# Latest CF-100 Incorporates Big Changes



**REAR VIEW** of final line shows broad plan of plane's fuselage-nacelle area.

By Irving Stone

The CF-100—probably the most heavily armed all-weather interceptor this side of the Iron Curtain—effectively demonstrates the airplane and engine design and production capabilities of A. V. Roe Canada Ltd., Malton, Ontario.

The first Mark 4 all-weather version of the CF-100 series came off the assembly line last fall, with production following at a very good acceleration rate, considering the fighter's structural size and diverse array of equipment it carries. Probably being turned out at a rate of more than one a day under a far-from-peak schedule, the CF-100's gross is about 37,000 lb., with structure alone accounting for about 15,000 lb.

▶ **Progression**—The transition from the Mark 3 to the all-weather Mark 4 is a radical progression involving these major changes:

• **Firepower** has been greatly increased by incorporation of rocket firing provisions. The Mark 3 was not fitted with rockets. The Mark 4 carries wingtip

pods, each accommodating 30 rockets. Middle section of this pod is metal, nose and aft sections are glass-reinforced plastic. Tail section is automatically jettisoned with initiation of the firing cycle, while the nose section is shattered as the rockets blast out.

A belly pack in the fuselage center section, nesting another 48 rockets, will drop, fire and retract in about one second.

Pylons under each wing can accommodate a pair of air-to-air missiles developed at Canada's National Research Council in collaboration with USAF. Eventually, the CF-100 will bristle with six Hughes F-98 Falcon missiles at each wingtip, AVIATION WEEK has learned.

An eight-gun pack located forward of the belly rocket pack is fed with more than 1,500 rounds of ammunition.

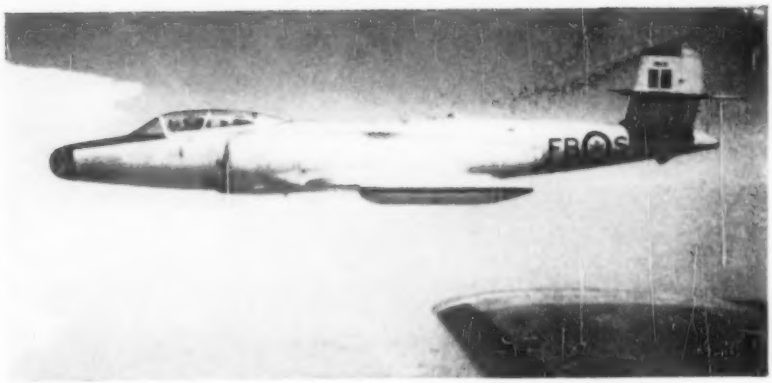
• **New radar,** the Hughes APG-40, affords improved search and fire-control capabilities.

• **New autopilot,** a Minneapolis-Honeywell system, MH-11B, will be tied in with the radar for automatic interception and fire control, doing more precise job than the pilot could do, also relieving him of the need for scanning the radarscope.

• **Increased boost ratio** on the controls will result in easier handling and maneuvering.

• **Improved cockpit arrangement** gives better instrument visibility for all-weather flying. Instruments have been raised on the main panel, and control stick has been shortened—made possible by increase in boost, because less leverage is required.

• **Stronger canopy,** a single-piece, free-blown enclosure, allows more uniform distribution of stresses than was possible with the two-section molded plastic unit in the Mark 3 and early Mark 4. The new installation permits the Mark 4 to use a higher cockpit differential pressure—3.5 psi. as against 2.75 psi. in the Mark 3.



**CF-100's NEW NOSE** houses radar fire control unit. Canopy will be one-piece.

• **New model engine,** the Avro Orenda 11, with a minimum guaranteed thrust rating of 7,000 lb., will be installed in the Mark 4 this summer. This engine, with its dual turbine wheels, is expected to deliver about 10% more thrust than the single-turbine Orenda 9 installed in the early Mark 4s.

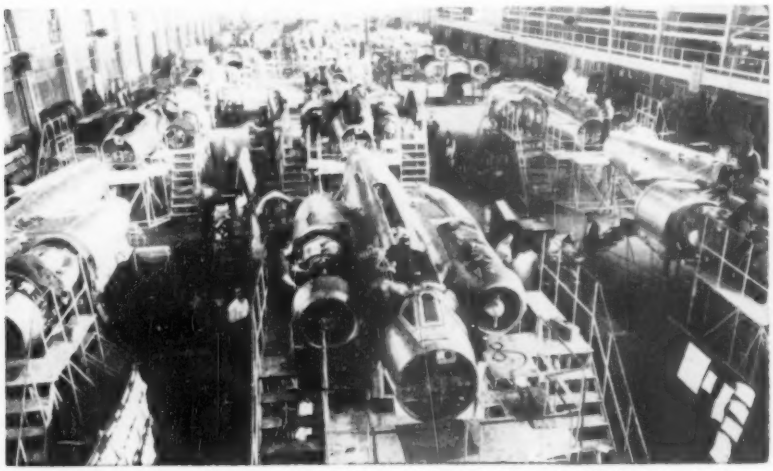
• **De-icing** for the plane and anti-icing for the engine complete the preparation for all-weather operation. The Mark 3 had no provisions for combating ice hazards. De-icing is with a Goodyear electrically heated rubber sheet on the wing and empennage leading edges, automatically cycled by icing conditions. Aerodynamically operated perforated spray booms projecting from the bullet nose in the engine air inlet direct alcohol over the inlet screen to prevent ice-over.

A Nesa glass windshield affording anti-icing on its outside and anti-misting on the inside replaces the scheme for the Mark 3, which circulated hot air against the inside of the windshield.

Original work on the airframe de-icing system was conducted in 1950-51 with Avro's prototype Jetliner as the proving vehicle, for which Goodyear built the installation. Participating in the research were representatives of Avro, Canada's National Research Council, and the National Advisory Committee for Aeronautics, Civil Aeronautics Administration and Goodyear in this country. In the spring of 1953 development work was carried on with the CF-100 (Mark 3) in conjunction with NRC and Goodyear, while in the spring of this year the de-icing installation was made on the Mark 4.

• **Tooling** changed about 75% from that used for the Mark 3. This mainly was because of the new, longer nose to house avionic installations, modifications brought on by the rocket pack in the belly and internal changes throughout the airplane. Mark 4 fuselage is about 26 in. longer than the Mark 3's.

► **From 1 to 4**—Avro built only two Mark 1s of the CF-100 series. These were followed by 10 pre-production



**FRONT VIEW** of assembly line where jet engines have just been installed.

**STABILIZER LINE** shows wide units.

planes, designated the Mark 2. After this, about 70 Mark 3s came off the line, followed by the Mark 4s, of which more than 100 have been built to date. The plane is in multi-squadron service with the RCAF.

Planning for the Mark 4 began in November 1952. Tool design began one month later, tool fabrication being done in January-February 1953. First parts were made during the two months following, subassemblies in the next two months. In September 1953, about two months after the major assemblies went together, the first Mark 4 was completed.

It was fabricated for a manhour figure comparable to similar efforts in the industry. Now, Avro is working along an approximate 85% improvement curve for manhours per pound of airframe.

▶ **Smooth Transition**—Transition from the Mark 3 to the Mark 4 was accomplished without a shop layoff, because a lot of production people were shuttled into tooling, plant rearrangement and plant maintenance for about eight weeks, then reverted to production jobs as the new tools were put into work for the Mark 4.

As this tooling was introduced, toolroom facilities and toolmakers were used to produce the ground-handling equipment for concurrent delivery with the aircraft.

Normally, ground-handling equipment is not built by the airframe manufacturer. But Avro took on the job because it enabled the company to retain its substantial core of skilled toolmakers during a period when they ordinarily would have been reduced in force. Also, it gave Avro better coordination between design engineering and production shops for building the equipment, resulting in less cost and a more uniform product for improved interchangeability of the handling equipment.

Included in this ground-handling equipment are such items as armament sighting devices, gun hoists, rocket handling units, stands, ladders and specialty items.

▶ **Space Utilization**—Major assembly component stations for the CF-100 are located on the factory floor for efficient feeding to final assembly. Throughout the assembly area, no provision is made for stacking of components. While space thus appears to be very tight on the production floor, this approach is followed to promote a more efficient flow—by necessity, each part has to be moved when it is finished. This also tends toward maximum use of available floor space.

(Reports are that Convair also uses a similar scheme for its F-102 production. Starting work with the new plane in a new plant, it was possible to arrange a very compact production spacing scheme. This also indicates to industry observers that a pretty firm production schedule exists for the F-102.)

▶ **Not Near Peak**—Work equivalent to about 18% of manhours involved on Avro's CF-100 is subcontracted. Chatco Mfg. Co., Tilbury, Ont., makes the rear center section. Fleet Mfg., Ltd., Fort Erie, Ont., supplies the ailerons and rocket pod. Dowty, Ajax, Ont., supplies the landing gear. Many other companies are involved in parts machining and fabrication of other small items.

Just now, Avro is capable of turning out much more airframe poundage, since a good share of the plant is working but one shift—on wings, empennages and center sections. Nose and final line sections are on a two-shift basis. Overall, the plant is operating far from its total capacity.

▶ **Test, Experimental Station**—Complementing Avro's production activity is a new flight test and experimental facility. This function is capable of receiving the plane and firing its armament in practice tests. Rockets are fired into a concrete tunnel serving as a safety enclosure.

The facilities also are used for experimental and development work on armament projects.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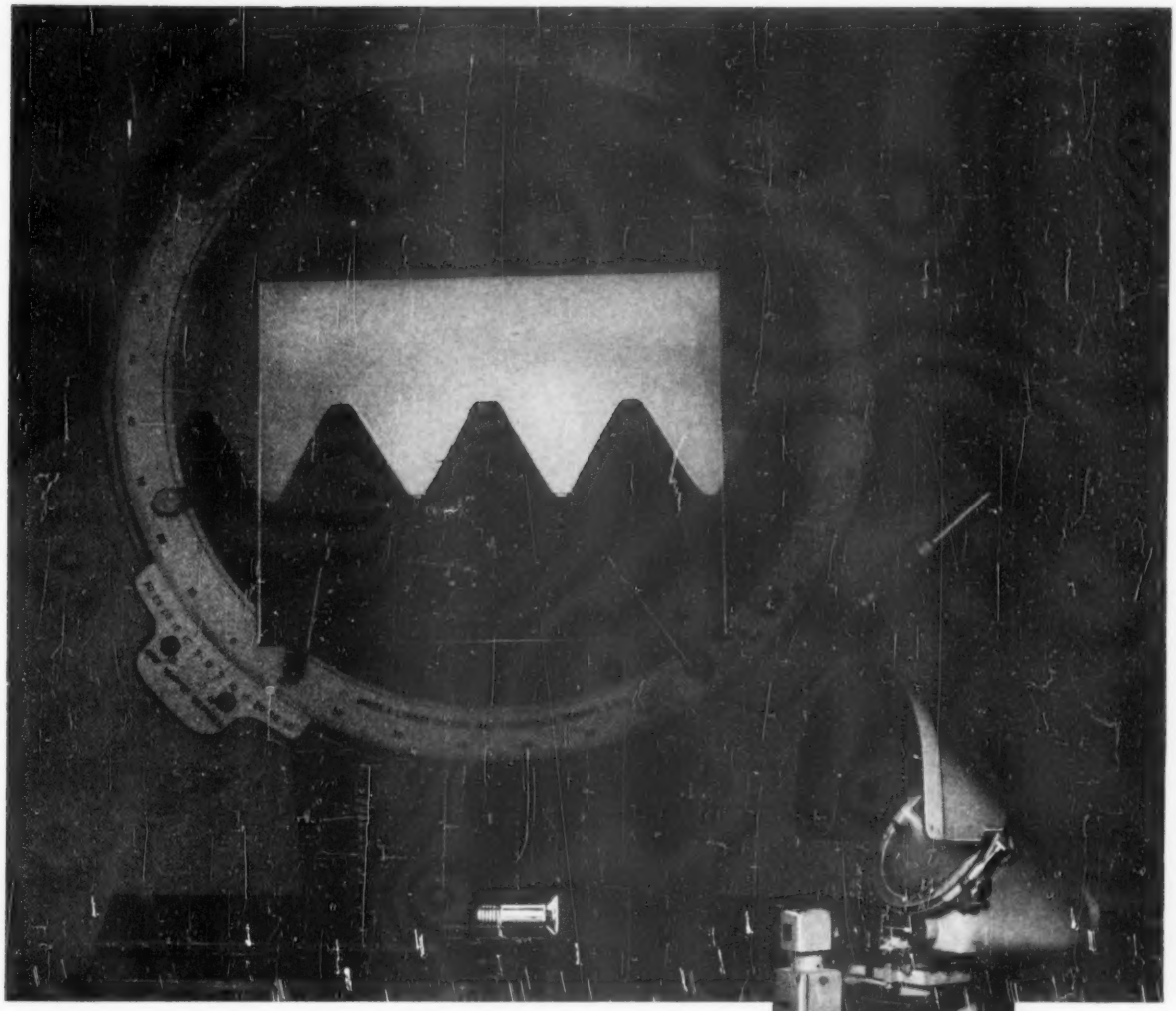

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# NACA Curbs Jet Crash Fire Menace

**• High-pressure water spray, directed against hot engine parts, cools them down, prevents ignition.**

**Cleveland**—A simple solution to the problem of jet aircraft crash fires has been evolved at the National Advisory Committee for Aeronautics.

The successful, experimental inerting system developed at Lewis for eliminating jet engine crash fires is simply a matter of directing a high-pressure water spray against hot parts of the jet plant to cool possible ignition sources for fuel and oils.

▶ **18 Months Payoff**—Progress in this field of research, an extension of full-scale studies formerly conducted on the origin and development of piston-powered plane crash fires, was revealed recently at the 1954 inspection of NACA's Lewis Flight Propulsion Laboratory, Cleveland.

The organization's researchers have been working on development of the inerting system and proving it in laboratory and field trials for only the past 18 months.

While NACA has made no official comment on the immediate prospects of such an inerting system, AVIATION WEEK has learned that:

• **Air Force is supporting** development of hardware for creating a service installation based on the experimental work NACA is doing.

• **Within a year** it is likely that some version of this NACA inerting system will be fitted on jet engines in service aircraft, on an experimental basis.

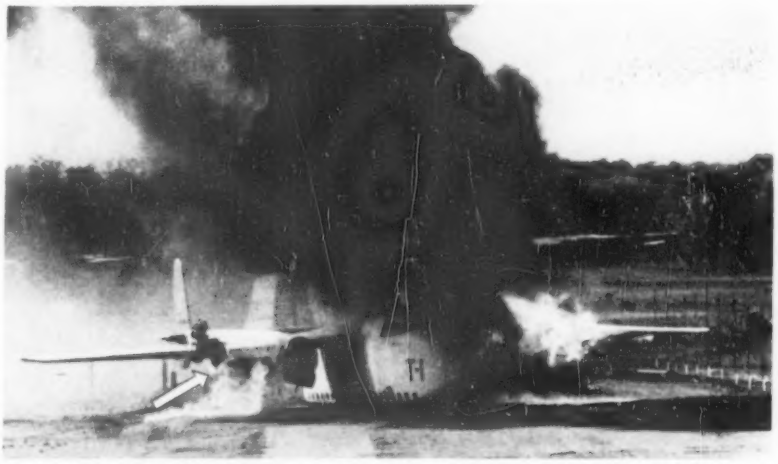
• **Future commercial jet transports** will be required to carry a water inerting system as a safety feature, industry observers believe. Boeing Airplane Co., now pushing its jet transport development, is reported to be in close touch with NACA's experimental work.

• **Application of the inerting system** to existing or future jet powerplants will be a straightforward job involving few, if any, problems.

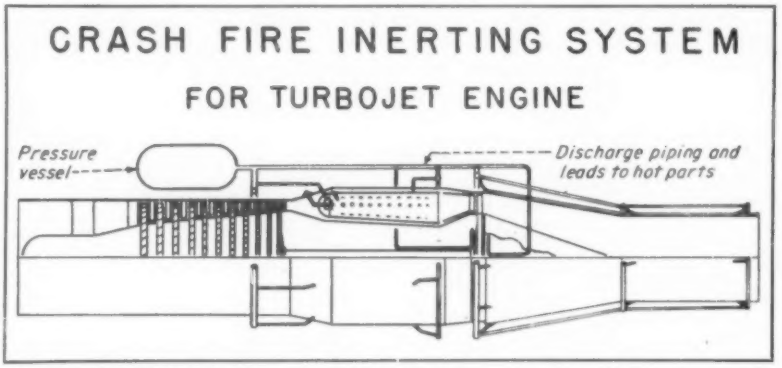
• **Little weight penalty** will be involved, since jet planes normally would carry water for assisted takeoff with water injection. Piping weight, too, is expected to be nominal.

The fluid used need not necessarily be water, but there seems to be no reason why some other medium should be employed, because the problem is merely one of cooling. Water, with the highest heat of vaporization, appears to be an ideal liquid.

▶ **From Piston to Jet**—In NACA's piston-powered-aircraft crash fire studies, a plane was accelerated (under its own power) from rest and guided into a crash barrier (AVIATION WEEK Jan. 26, 1953, p. 74).



**CRASH FIRE RESEARCH PLANE** plows through barrier and burns. NACA studies show that fire sources in jet engine (arrow) could be eliminated with . . .




**WATER INERTING SYSTEM** such as this, developed at NACA. High-pressure water spray against parts aft of the compressor lowers temperature to safe value.

The damage imposed was typical for a landing or takeoff accident. This type of accident was studied by NACA researchers, because airplane speed involved was relatively low, affording a good chance for human survival. Much of the data gleaned from these studies, it was found, were applicable to jet-powered aircraft, with other considerations involved.

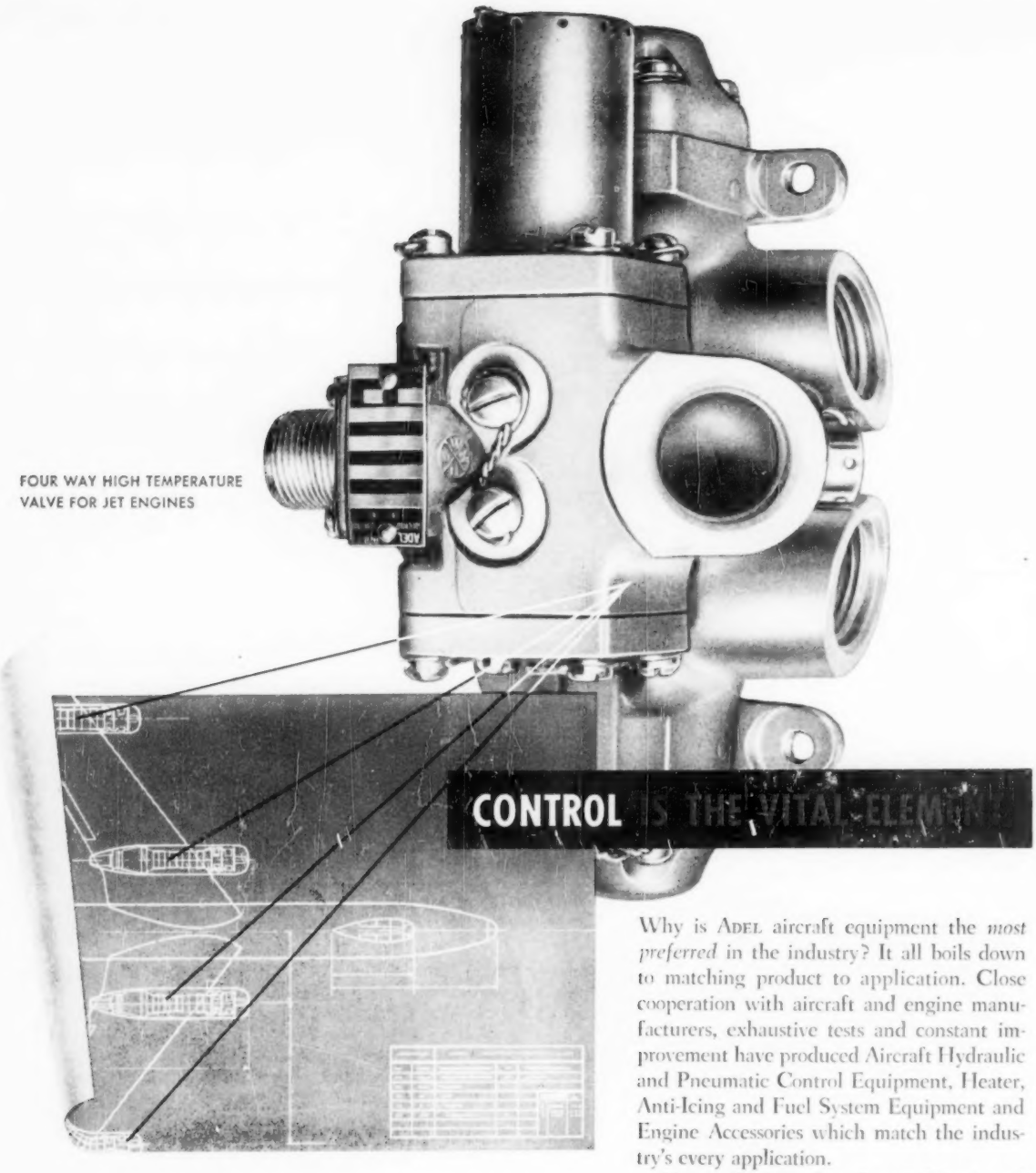
Unlike the propeller-fitted engine, which will stop when prop hits the ground, the turbojet's compressor and turbine may continue to rotate after the crash, sucking in large amounts of air through the inlet. Fuel spilled in the crash also may be drawn in with this air, ignited by hot spots within the engine.

Hot external surfaces of the engine also are a source of ignition for spilled fuel and other liquid combustibles. Both of these possibilities initially have been proved in test pits.

▶ **Jet Experiments**—In test pit runs, where the engine was brought up to temperature, fuel to the combustors was first shut off, then other fuel was sprayed into the air entering the rotating compressor. Result: flame not only was propagated out the engine exhaust, but out of the engine inlet as well, thus reversing the direction of the normal airflow.

NACA extended these fire trials to actual full-scale crash conditions. Piston engines were removed from service-weary cargo planes, and pylon-supported turbojets were installed under the wings to simulate one type of jet bomber.

The jet-operated plane was run into a crash barrier, with fuel flow stopped at impact. Spilling fuel, dyed red for purposes of observation, was drawn into the engine. Fire occurred at the tailpipe and also at the engine inlet. Flames at these locations ignited additional fuel spilling from the damaged



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wing, resulting in major fire.

▶ **Cooling Plan**—Temperature survey of the engine parts following fuel shutoff revealed that although components were rapidly cooled by the continuing flow of air through the engine, there was a short, critical period after the crash, during which components aft of the compressor remained sufficiently hot to constitute ignition sources. Thus, the turbine wheel remained hot enough to be an ignition source for many minutes after the crash.

Because ignition occurred only in relatively few areas where the gas flowing through the engine moved at low velocity, NACA researchers found it feasible to introduce cooling by direct application of water. Steam generated by the evaporation of water on the wetted hot surface protected against ignition during cooling of the part to a safe temperature.

On the turbine wheel, water was applied against the hub, with centrifugal force of the wheel distributing the liquid over the wheel face. Water sprayed against the tailpipe, it was found, would be kept in contact with the metal, to promote cooling, by a stainless steel screen wrapped around the pipe.

▶ **Four Crashes, No Fire**—In crash tests with turbojet-fitted planes, water was carried under gas pressure and discharged upon impact.

In four crashes, barriers were arranged to induce various types of damage. For example, one plane was ground-looped; another had an engine torn from its wing and tumbled through the cloud of fuel spray behind the plane.

These crashed planes used the water inerting system for engine cooling. In no case did the crash result in a fire.

NACA is continuing its crash fire studies. Plans include the investigation of ignition hazards in a variety of gas turbine engines, including those with high compression ratio. Among the factors to be studied will be effect of mechanical condition and cleanliness of the engine.

▶ **Details for Industry**—NACA researchers aren't trying to work out minute details of inerting systems. This facet belongs to industry.

Thus, one problem industry will have to work out will be whether to use an air bottle for discharging the water in the inerting system or to use a cartridge-type system to generate gas under pressure to discharge the water.

It would appear that the cartridge-type installation would be the more feasible, allowing lighter construction of parts to be pressurized, since strength would be based on a one-shot use, whereas an air bottle, normally heavier, would be carried charged for the life of the plane. —IS


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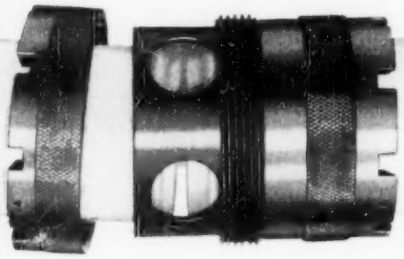

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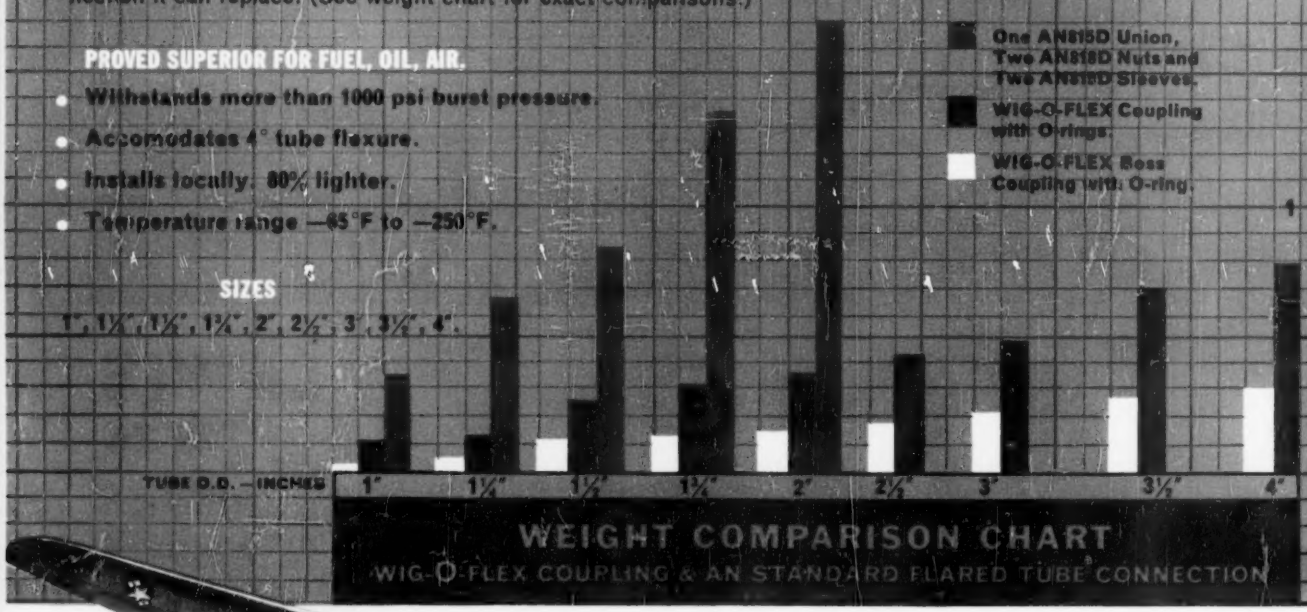
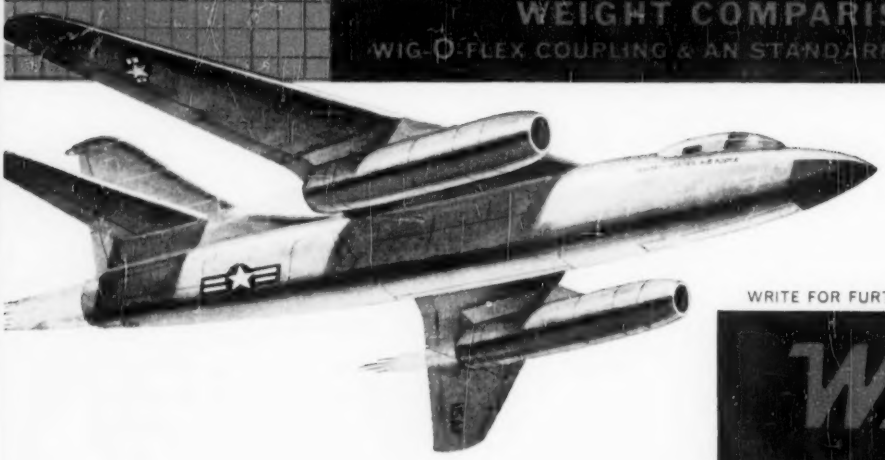



**WEIGHT COMPARISON CHART**

WIG-O-FLEX COUPLING & AN STANDARD FLARED TUBE CONNECTION



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# ARDC Contracts

The following contracts have been announced recently by Headquarters, Air Research and Development Command, Baltimore 3, Md.

• **AEROJET GENERAL CORP.**, Azusa, Calif., research and reports on "Study of Combustion Instability in Solid Propellant Rockets," $51,824.

• **CENTURY ENGINEERS, INC.**, 2741 No. Naomi St., Burbank, Calif., engineering change to increase the scope of work on development of pressure transducer calibrator, $56,733.

• **JOHNS HOPKINS UNIV.**, 1315 St. Paul St., Baltimore 2, Md., research and reports on "Characteristics of the Turbulent Boundary Layer at Supersonic Speeds," $79,513.

• **H. D. JUSTI & SON, INC.**, 32nd & Spring Sts., Philadelphia 4, Pa., research and reports on "Bacteriostasis and Adhesion of Autopolymer Resins," $25,097.

• **RESEARCH FOUNDATION OF THE STATE UNIVERSITY OF N. Y.**, Syracuse, N. Y., research and reports on "Space Allowance in Troop Housing in Relation to Epidemiology of Respiratory and Allied Diseases," $51,986.

• **REGENTS OF THE UNIVERSITY OF MINN.**, Minneapolis, Minn., research covering "Free Jet Configuration," $42,108.

• **UNIVERSITY OF MINN.**, Minneapolis, Minn., research on "Study of Scavenging Scoop-Diffuser Combination," $28,771.

• **TECHNICAL OPERATIONS, INC.**, 6 Schouler Ct., Arlington 74, Mass., research on the quantitative conversion by phosphors of the energy of beta particles into fluorescent quanta, $86,210.

• **UNIVERSITY OF MARYLAND**, College Park, Md., reports on "Mathematical Research and in the Fields of Fluid Dynamics and Elasticity," $29,059.

• **UNIVERSITY OF ROCHESTER**, Rochester 20, N. Y., research and reports on "A Study of Oxygen Poisoning," $26,250.

• **UNIVERSITY OF TEXAS**, Austin, Tex., research and reports of skin friction effects at supersonic speeds, $64,000.

• **OHIO STATE UNIVERSITY**, Research Foundation, Columbus, Ohio, development of improved methods for evaluating the effectiveness of RB-47 crews, job, $70,000; research and reports on "A Study of Circulatory Changes After Exposure to High Altitudes Without Hypoxia," job, $28,099.

• **UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE**, Baltimore 1, Md., research and reports on "Intraneuronal Chemical Changes in Anoxia," job, $69,890.

• **BROWN UNIVERSITY**, Providence, R. I., continuation of research on the aerodynamics of compressible fluids, $39,940.

• **INDIANA UNIVERSITY FOUNDATION RESEARCH DIV.**, Bloomington, Ind., additional work and funds and extension of time for "general problem of information reception by people under multi-source conditions," $30,603.

• **SVERDRUP & PARCEL**, Syndicate Trust Bldg., St. Louis, Mo., additional work on ram jet addition at Arnold Engineering Development Center, $54,559; additional work and extension of time for equipment and construction of adjustable diffuser being added to the Supersonic Circuit of the PWT at AEDC, $696,442.

• **UNITED AIRCRAFT CORP., Research Department**, East Hartford 8, Conn., additional work and funds and extension of time for pressure-recovery study, $26,400.

• **PEREIRA & LUCKMAN**, 9220 Sunset Blvd., Los Angeles 46, master plan of Holloman AFB, Alamogordo, N. M., job, $47,387.

• **REGENTS OF THE UNIVERSITY OF MINN.**, Minneapolis 14, additional funds and extension of time on research study of "Digital Output Pressure Transducer," job, $29,888.

# Gentile Depot Awards

The following contracts were recently announced by Gentile AF Depot, Dayton 10, Ohio:

• **AC Spark Plug Div., General Motors Corp.**, Milwaukee 2, miscellaneous spare parts for test equipment, 48 total; gage, torque measuring, developed by various motors per specified currents, Sperry 1,000,-111; 14 ea., $35,393.

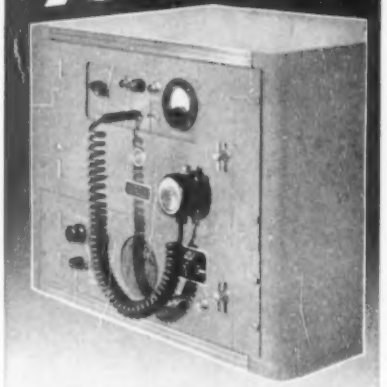
• **A. R. F. Products, Inc.**, 7627 Lake St., River Forest, Ill., dummy loads, 453 ea., $56,126.

• **Farrand Optical Co., Inc.**, Bronx Blvd. and E. 238th St., New York 70, N. Y., flowmeter, desiccator, pump fitting, 68 ea.;

## Ryan Steps up Jet Firebee Production

First view showing quantity production of jet-powered Firebee target drones by Ryan Aeronautical Co., San Diego, reveals a considerable number of the small "birds" in various stages of construction for USAF, Navy and Army. The Firebee is a near-sonic, ground-controlled vehicle designed to simulate highspeed jet fighters and carries a parachute for landing intact after its mission so that it may be used again. Powerplant is either a Fairchild J44 or a Continental J69.


Tel-Air



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# Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

**How would you like to have a fuel pump that has a five-to-one advantage over all current pumps?**

**In other words, for the same weight and current, a pump that will produce five times as much fuel as standard aircraft types.**

**With Whittaker's new fuel pump, you can have a B-26 type pump weighing 2¼ pounds drawing 2½ amps that will deliver 5 times the amount of fuel or 5 times the pressure of the conventional B-26 pump.**

Whittaker has such a pump, a mechanical – and tested – marvel that Dell Phillips, Vice-President in charge of Research, has been developing over the last three years. A year ago the company realized it really "had something" in Dell's development, but there has been no effort to push the design.

Designer of new pump, Dell Phillips of the Wm. R. Whittaker Co.

As Glenn Whittaker explained: "Anyone can tell you the pump business is rugged... This is our first venture into the field ...We wanted to prove our pump's performance before we started to toot our horn... So we've moved slowly and cautiously in a program that has run well into six figures to date."

**Now, with the pump thoroughly tested and proved, Whittaker is going into production on two models, and several major aircraft companies familiar with the development are asking for large-order deliveries first.**

Phillips started puzzling out the problem of a small package, high-efficiency pump way back when he was designing a flow divider for the huge Douglas C-124.

Conventional positive displacement pumps, he found, jammed their pumping cavities so full of vanes and gears, there was little room for displacement. Ten percent was a good ratio.

**Dell's new pump displaces 90 percent of the pumping cavity per revolution.**

He found, too, that every centrifugal pump was inordinately inefficient, and required extremely high r.p.m. under take-off or after-burner conditions. This resulted in unnecessary heating of the fuel especially when throttled back to approximately 1/30 of its rated flow. Under this low flow condition, the centrifugal pumps drew excessive current, producing excessive heat and pressure.

So Dell went to the positive displacement principle. He eliminated unnecessary working parts, held his pump to two moving sections – rotor and oscillator – and developed efficiency through a scientifically-shaped rotor turning at a nominal 1000 r.p.m. Other pumps turn up to 8000 r.p.m., some up to 20,000. Dell's pump will draw constant current regardless of pumping rate – and the current drawn is only about 1/3 to 1/5 as much as with a centrifugal pump at any given flow rate. Pressure remains constant.

Furthermore, he made his pump self-priming – whereas the standard centrifugal pump has to be submerged to operate – and built into it the ability to suck up fuel from every nook and cranny of a tank.

Perhaps the greatest single advantage of Dell's pump is its efficiency, in all cases over 80 percent – whereas, the average pump efficiency is but 15 percent.

**The pump has been the hardest job Whittaker's "idea man" has ever tackled. The odd-shaped rotor was the toughest part, of course, and now that Dell has finally perfected its shape, it will be cast in aluminum alloy or other metal and thinly coated with moulded nylon.**

Why? Because nylon has an extremely low coefficient of friction and excellent wear properties, because it is chemically inert to aircraft fuels, because it is a close tolerance finish, and because it will give certain resilience for pieces of grit and other foreign matter that may flow into the pump.

Dell has applied the same principles to a flow-proportioning device that will fit into existing fuel systems. It will accurately proportion fuel flows from 2 or more sources. This new unit has been tested extensively and will soon be in production.

**You've relied on Whittaker for the best in aircraft valves for a long time.**

**Now... you can rely on Whittaker for a... really efficient... aircraft fuel pump.**

maintenance data, 9 ea., fixture, range, torque, 9 ea., $29,445.

• **American Machine & Metals, Inc., Richle Testing Machine Div.**, East Moline, Ill., instrument hardness tester, portable, 115 ea., $27,790.

• **American Measuring Instruments Corp.**, 21-25 44th Ave., Long Island City 1, N. Y., wavemeter test set, 224 ea., $40,266.

• **American Radio Hardware Co.**, 152 MacQuiston Parkway, Mt. Vernon, N. Y., miscellaneous terminal boards, 2,420 ea., $45,096.

• **Ballantine Laboratories, Inc.**, Fanny Rd., Boonton, N. J., voltmeters, electronic, Ballantine Laboratories Type #300, 935 ea., $171,105.

• **Carter Parts Co.**, 213 W. Institute Place, Chicago 10, switch, toggle, two-position, locking, SPST, 40,000 ea., $25,600.

• **Cosmos Industries, Inc.**, 31-28 Queens Blvd., test oscillator BC-376, 190 ea., $34,175.

• **Eclipse-Pioneer Div., Bendix Aviation Corp.**, Teterboro, N. J., multitester, gyro-fluxgate, compass, 36 ea., $31,271.

• **Elastic Stop Nut Corp., AGA Div.**, 1027 Newark Ave., Elizabeth, N. J., transformers, 30/45 watt, 37,500 ea., $429,750.

• **Fairchild Camera and Instrument Corp.**, 225 Park Ave., Hicksville, L. I., N. Y., resistors-potentiometers, 391 ea., $45,316.

• **Gabb Special Products Div., E. Horton & Son Co.**, Windsor Locks, Conn., indicator piston, for 14-mm. spark plugs, Gabb Mfg. Co. model Time Rite C-14, 307 ea., indicator piston position, for 18-mm. spark plugs, Gabb Mfg. Co. model Time Rite C-18, 1,267 ea., $63,046.

• **General Communication Co.**, 681 Beacon St., Boston 15, Mass., modification kits used on AN/APR-9 and spares as follows: 935 ea., high voltage transfer switch, 115 ea., capacitors, 115 ea., seal assy., 1,380 ea., nameplates, 115 ea., $103,199.

• **General Electric Co.**, Gas and Electric Bldg., Dayton, lamp, 500 watt, 6.6 amp., 48,000 ea., $175,129.

• **General Electric Co.**, 1 River Rd., Schenectady 5, N. Y., transformer, power, isolation type MC-2, 26,318 ea., $428,983; transformer, 53 ea., $129,447; capacitor, fixed, paper dielectric, direct current, 3,060, $54,672.

• **Precision Associates Inc.**, 354 Cumberland St., Brooklyn 17, N. Y., testers, rocket, continuity and circuit, type A-1, 1,444 ea., $71,604.

• **Radiant Lamp Corp.**, 300 Jelliff Ave., Newark 8, N. J., lamps, $90,650.

• **Radio Corp. of America, RCA Victor Div.**, 19th and Federal Sts., Camden, N. J., multimeter, port. elec. a.c. and d.c., RCA Senior Voltohmist, types WV-97-A, 5,933 ea., $30,443; panel, steel, 67 ea., network, pulse forming, mounting, aluminum, 2 ea., yoke-deflection coil housing, 45 ea., $28,407.

• **Standard Electric Products Co.**, 2240 East Third St., Dayton 3, resistors, fixed, composition (insulated), 372,317, $33,430.

• **Telectro Industries Corp.**, 35-16 37th St., Long Island City 1, N. Y., spare parts, for testers, gun-bomb-rocket sight, type G-3, $8,200,686.

• **Thwing-Albert Instrument Co.**, Penn St. & Pulaski Ave., Philadelphia, potentiometer, portable, Thwing-Albert model PN-40 modified, 121 ea., $41,745.

• **Thompson Products Inc., Electronics Div.**, Cleveland, switch, rotary, type SA-185/V, 300 ea., $34,425.

• **Transformer Engineers**, 161 East California St., Pasadena, Calif., transformer, power, 600 ea., $60,600.

• **Tung-Sol Electric Inc.**, 95 Eighth Ave., Newark, N. J., tube, electron, 252,825 ea., $758,475.

• **United Manufacturing Co., United Advertising Corp.**, 41 Haig St., Hamden 14, Conn., tester, tachometer, field, portable, type M-5, 1,059 ea., $619,770.

• **WAC Engineering Co.**, 35 South St., Dayton 2, tensiometer, aircraft control cable, 3,657 ea., $354,800.

• **Western Electric Co., Inc.**, Winston-Salem, N. C., transformer, 47 ea., $34,900; transformer, 147 ea., $39,322.

• **Westinghouse Electric Corp.**, 32 N. Main Street, Dayton, lamp, 68,000 ea., $172,784.

• **Yellow Springs Instrument Co., Inc.**, P. O. Box 106, Yellow Springs, Ohio, timer, electrical, interval measuring, 105 ea., $55,132.

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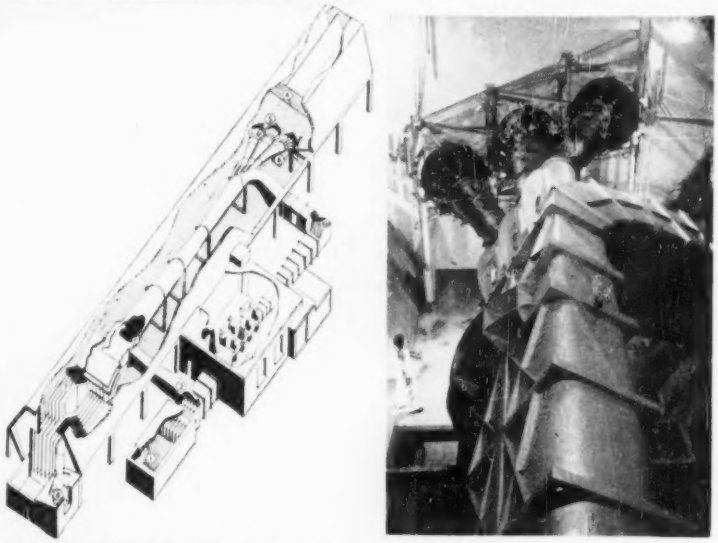
*Aviation Week Picture Brief*



**DH HIGHSPEED TUNNEL** schematic shows 1) tunnel air intake and silencer; 2) warm air inlet from main exhaust to prevent condensation in working section; 3) control room and working section; 4) engine air intake and silencer; 5) engines; 6) engine observation room; 7) exhaust silencers; 8) ventilation extractor fan. View at right shows 2-ft. square working section.

# DH Readies Highspeed Tunnel

First air was drawn through the test section of the de Havilland Aircraft Co.'s new ejector-drive highspeed windtunnel toward the end of March, and routine tests are now being made.

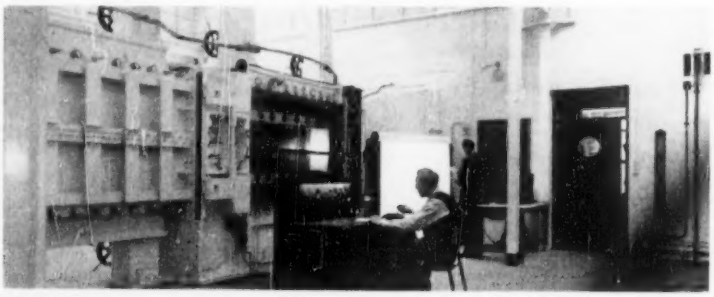
This tunnel operates over a speed range from Mach 0.8 to Mach 1.6; a second tunnel for lowspeed testing is nearing completion.

The tunnel, like some others in Britain, the U.S. and Sweden, uses conventional turbojet engines blasting into the tunnel system downstream of the test section. Their ejector action induces an airflow into the upstream end and past the test section, where the mixed flows discharge to the atmosphere.

Completion of the pair of tunnels will make de Havilland completely independent for the first time of the preflight aerodynamic testing now conducted at the Royal Aircraft Establishment, Farnborough. RAE has produced satisfactory results, but the test schedule is so overloaded that DH found it increasingly difficult to get the results it wanted on schedule. These tunnels are intended to relieve that time bottleneck.

Powerplant for the highspeed tunnel consists of three DH Ghost turbojets from the prototype Comet.

The company says it will use the facility to test new designs and for research on general aerodynamic problems.



**OPERATOR** at console observes shock waves through windows with schlieren apparatus. Tunnel is not operating in this picture; working section door has been removed, showing typical set of liners.

## PRODUCTION BRIEFING

▶**Grand Central Aircraft Co.,** Glendale, Calif., has received five Beech C-45Gs from USAF, first of a group destined to keep the overhaul base occupied for a year.

▶**Cox & Stevens Aircraft Corp.,** Mineola, N. Y., maker of portable electronic weighing kits, has been acquired by Neptune Meter Co., N. Y., which also took over Revere Corp. of America, Wallingford, Conn., in January.

▶**Bigelow Fiber Glass Products Div.** of Bigelow-Sanford Carpet Co., Inc., New York, has installed additional production facilities which more than double current glass mat output. New equipment will permit producing mechanically bonded glass mat up to 84-in. wide ranging in weight from 2 oz. to 8 oz. per square foot.

▶**Kramme & Zeuthen Corp.,** Denmark, are building KZ-10 reconnaissance planes for export to Switzerland, Norway and Finland. The KZ-10 is a single-engine light monoplane with a 135-mph. top speed and 22-mph. minimum flying speed.

▶**AiResearch Div.** of the Garrett Corp., will build a $300,000 addition to its engineering department at Phoenix, Ariz. The firm has a $4.15-million turbine engine development section already underway.

▶**Aircraft Fitting Co.** has leased a new $500,000 plant for 15 years on Brook Park Rd., Cleveland, Ohio. Here the company will produce a new line of flexible hose couplings under an agreement with Joy Mfg. Co.

▶**Sciaky Bros., Inc.,** Chicago, is closing its plant and offices July 26-Aug. 6 for annual vacation period. Operations will be resumed Aug. 9.

▶**Allmetal Screw Products Co.'s** current mailing address is 821 Stewart Ave., Garden City, L. I., N. Y.

▶**Fairchild AFB,** Spokane, will undertake a $5,176,000 runway expansion program in 1955 to accommodate the eight-jet Boeing B-52 heavy bomber if funds, approved by the Budget Bureau, are passed by Congress.

▶**Vapor Heating Corp.** has moved into new $2-million plant at Niles, a suburb of Chicago. The plant has about 220,000-sq. ft. of factory and office space. In the aviation field, the firm manufactures temperature control systems for USAF and Navy jet aircraft.

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Dow Corning Corporation, Dept. D-19, Midland, Michigan

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**The Convair 340** is a modern 44-passenger airliner, produced by Consolidated Vultee Aircraft Corp., San Diego, Calif. This type has logged billions of passenger miles for leading airlines on six continents.

# The Convair 340 demonstrates how Stabilized Stainless Steels may help you

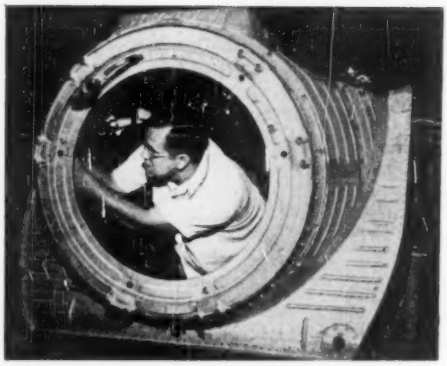
Consolidated Vultee uses Types 347 and 321 interchangeably in the Convair Liner 340, because these stainless steels provide:

- ★ **Ability to carry load at elevated temperatures**
- ★ **High resistance to oxidation at elevated temperatures**
- ★ **High resistance to corrosive gases**
- ★ **Tensile strength up to 300,000 psi when cold-worked**
- ★ **Good forming qualities**
- ★ **Good welding qualities**

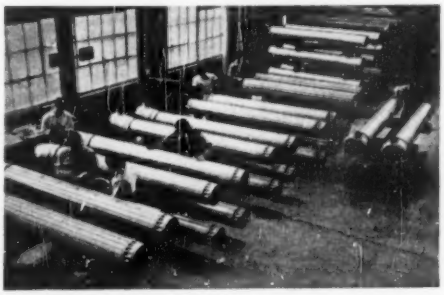
These austenitic chromium-nickel stainless steels are "stabilized" by the addition of columbium or titanium, thus causing proper distribution of the carbides. This distribution is highly important to avoid adversely affecting properties by welding or exposure to service at high temperature.

It will pay you to investigate all the benefits stainless steels can provide in aircraft or other lightweight construction.

Leading steel companies produce austenitic chromium-nickel stainless steels in all standard commercial forms. A list of sources of supply will be furnished on request.



**Type 347 or 321 Stainless Steel** is utilized in the shroud assembly, installed in the Convair by Rohr Aircraft Corp., Chula Vista, Calif. Note bolt holes for attaching engine. The shroud acts as a firewall between engine and remainder of nacelle which houses hydraulic liquid and oil tanks.



**Stainless Steel** augmentor tubes, also produced by Rohr Aircraft, are resistant to heat and corrosion, and carry exhaust gases from engine to rear of nacelle for additional or augmented thrust.

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THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

## Learstar Flies at 312 Mph. in Tests

Studies of carefully calibrated flight tests on the first production Learstar, a re-engineered Lockheed 18, show that the new 10-passenger business transport plane has attained 312-mph. true airspeed at 17,000 ft. pressure altitude while grossing 20,500 lb.

The Wright R1820-C9HD Cyclones were operating at 785 hp. (high blower) maximum recommended cruise power. Each engine delivers 1,425 hp. on take-off and is rated at 1,275 hp.

▶ **"Fastest" Twin**—The tests indicate that new Learstar is the "world's fastest twin-engine transport airplane," according to William P. Lear, board chairman and director of research and development of Lear, Inc.

Lear emphasizes that the Learstar is designed to CAA 4b specifications. A number of the planes have been ordered by U.S. and foreign corporations for executive travel.

▶ **Speed Recordings**—Other performance data gathered for the Learstar during its tests, loaded to 20,500 lb. gross weight and at 11,000 ft. pressure altitude:

- 311 mph. true airspeed using 890 hp. per engine and low blower with fuel consumption of 139 gph.
- 292 mph. TAS at 765 hp. with 120-gph. fuel consumption.
- 270 mph. TAS at 695 hp. and 100-gph. fuel consumption.

In addition minimum-altitude flights were made over the 28,594-ft. official measured course between Huntington Beach and Balboa, Calif. At 300-ft. altitude, pulling 1,240 hp. per engine and grossing 21,000 lb., the Learstar delivered 296-mph. TAS.

Speeds were determined by cross-checking readings from a swivel pitot on a four-foot boom extending from the port wingtip against readings gotten from a CAA trailing "bomb." Figures were corrected to NACA standard air.

▶ **Long Range**—Lear says that, to his knowledge, no other twin-engine transport-category plane can match these speeds at comparable percentages of power. He also points out that range has not been sacrificed to speed. The Learstar is credited with a maximum cruising radius of over 3,200 mi. and can fly 2,500 mi. at 300 mph.

Lear's executive offices are at 5171 S. Bundy Dr., Santa Monica, Calif.

## Navy Contracts

Contracts recently announced by Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

**Eclipse-Pioneer Div., Bendix Aviation Corp.**, Teterboro, N. J., barometric control, 188 ea., $52,822.

**Electroline Co., c/o F. O. Hoyt Co.**, 1417 Sansom St., Philadelphia 2, connectors, wire rope, $28,211.

**General Electric Co.**, 1405 Locust St., Philadelphia 2, Pa., amplifiers, control and servo, $1,529,325.

**General Textile Mills Inc.**, 450 Seventh Ave., New York 1, N. Y., flight deck helmet, 4,000 ea., $56,960.

**Hewlett-Packard Co.**, 395 Page Mill Rd., Palo Alto, Calif., frequency meter, 93 ea., $241,340.

**Kearfott Co. Inc.**, 1150 McBride Ave., Little Falls, N. J., vertical gyro transmitter, 11 ea., $27,145.

**Lear Inc., Lear & Romec Div.**, Abbe Rd., Elyria, Ohio, oil pump assy., $65,634.

**Lite Mfg. Co., Inc.**, 101 West 21st St., New York 11, panel target, 20,680 ea., $201,837.

**Wood Electric Co., Inc.**, P.O. Box 322, Newburyport, Mass., circuit breaker, 9,927 ea., $43,040.

**Air Associates, Inc.**, Teterboro, N. J., maintenance parts for F3H-2 aircraft, $28,855.

**Malbar Mfg. Co.**, 950 Doolittle Drive, San Leandro, Calif., spare parts for airplane jacks, $116,411.

**McDonnell Aircraft Corp.**, P.O. Box 516, St. Louis 3, Mo., maintenance parts for F2H aircraft, $83,600; adapter, 50 ea., $49,834.

**New York Rubber Corp.**, 100 Park Ave., New York 17, life raft, 1,050 ea., $196,539.

**Pacific Paint Varnish Co.**, 4th & Cedar Sts., Berkeley 10, Calif., exterior enamel, 16,000 gal., $27,360.

**Parker Aircraft Co.**, 5827 W. Century Blvd., Los Angeles 45, fuel valves, $51,296.

**Presto Beverage Corp.**, 834 Sterling Place Bklyn 16, N. Y., packet, sea marker, 56,380 ea., $33,190.

**Transitron Inc.**, 154 Spring St., New York 12, signal generator, 31 ea., $43,321.

**Vickers, Inc.**, 1400 Oakman Blvd., Detroit 32, armament parts, $28,183.

**Westinghouse Electric Corp.**, 3001 Walnut St., Philadelphia 4, electrical dummy load, 153 ea., $35,251.

**White-Rodgers Electric Co.**, 1209 Cass Ave., St. Louis, Mo., servo and spare parts for F6F-5K aircraft, $74,323.

**Chandler-Evans Div.**, Niles-Bement-Pond Co., W. Hartford, Conn., maintenance parts for various aircraft, $69,699.

**Douglas Aircraft Co., Inc.**, 3000 Ocean Park Blvd., Santa Monica, Calif., 23 items of maintenance parts for R5D aircraft, $27,501.

**Eagle-Picher Sales Co.**, 32rd & Arch Sts., Philadelphia 4, Pa., pigment: zinc oxide, $47,087.

**G. Felsenthal & Sons, Inc.**, 3500 N. Kedzie Ave., Chicago 18, Ill., board: chart, plotting, 1,483 ea., $54,560.

**General Textile Mills, Inc.**, 450 Seventh Ave., New York 1, N. Y., pilot's helmets, 11,650 ea., $270,746; inner helmet, 11,124 ea., $99,337.

**Glidden Co.**, 11001 Madison Ave., Cleveland 2, Ohio, lacquer: cellulose nitrate, $35,-139.

**Goodyear Tire & Rubber Co., Inc.**, 1144 E. Market St., Akron 16, Ohio, rotating dis's, 20,500 ea., $69,446.

**Hammond Lead Products, Inc.**, 5231 Hohman Ave., Hammond, Ind., pigment, 180,-000 lb., $29,556.

**Hydraulic Research & Mfg. Co.**, 2835 North Naomi St., Burbank, Calif., hydraulic valve, $34,821.

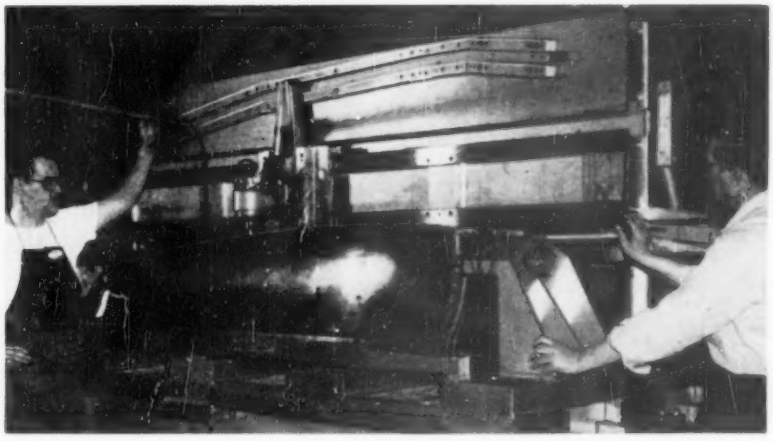
**Joy Manufacturing Co.**, 1201 Macklind Ave., St. Louis 10, Mo., cable assy., $58,088.

**Lear, Inc.**, 110 Ionia Ave., N.W., Grand Rapids 2, Mich., actuators and jackscrew, $37,093.

## Rome Depot Awards

The following contracts were recently announced by Rome AF Depot, Griffiss AFB, Rome, N. Y.:

- **American Fabricated Products**, 1420 E. 28th St., Indianapolis, hood, 35,000 ea., $20,235.
- **Bendix Radio Div., Bendix Aviation** Baltimore 4, equipment shelter, 1 ea., alarm system, 109 ea., amber filter, 519 ea., $93,723.
- **Continental Electric Equipment**, Box 1055, Cincinnati 1, cabinet relay assy., 210 ea., $55,650.
- **Fulton Mfg. Corp.**, Wauseon, Ohio, flashlight, 14,203 ea., $35,223.
- **General Electric Co.**, Electronics Park, Syracuse, N. Y., radar set, 9 ea., tower, 9 ea., radome, $677,080.
- **General Electric Co.**, 113 S. Salina St., Syracuse, N. Y., switch assy., 84 ea., $34,000; regulator, 152 ea., $650,200.
- **Hevi-Duty Electric Co.**, 4212 W. Highland Blvd., Milwaukee 1, regulator, 305 ea., $1,017,926.
- **Northern Radio Co.**, 143-145 W. 22nd St., New York 11, adapter, 893 ea., $40,720.
- **Royal Electric, Inc.**, P.O. Box 823, Dayton 1, cord, 5,500 ea., $48,588.
- **Royal Electric, Inc.**, Jamestown, Ohio, desk shelf, 1,162 ea., rack, 1,682 ea., $184,058.
- **Press Wireless Labs., Inc.**, West Newton, Mass., holder, contact brush, 9 ea., housing, slip ring, 6 ea., $35,793.

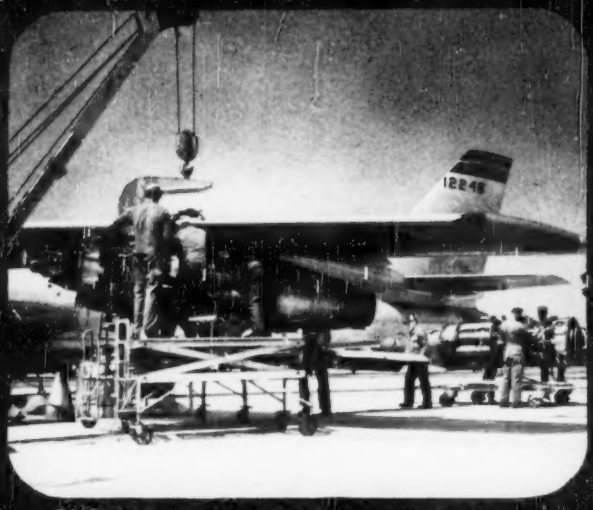


### 90-Minute Job Now Takes Five

**This trimming fixture, designed by Bell Aircraft Corp., does uniform final finishing of jet-engine pod doors in less than 5 min., compared with previous 90 min. required by hand-filing method. Device handles both left and right doors and is powered by an electrically operated cutting motor on a hand-driven chain drive moving on track.**

**0900** Stepping up on their work stands, line crew removes outboard engine cowlings.

**0906** Quick-disconnects of J47 electrical, fuel, and oil lines are completed.



**0911** Crane car lifts engine forward as replacement unit rolls into background.

**0914** Engine is swung away from wing as new J47 is pulled into position.

**0919** New engine hoisted up while crew installs J47 fuel, oil, and electrical lines.

**0924** Aluminum "bullet nose" and cowlings are clamped on just before running engine up.

## G-E ENGINES POWER S.A.C. OPERATIONAL MULTI-JET BOMBERS

# Simple design of G-E J47 helps S.A.C. crew make

# 25 MINUTE ENGINE CHANGE!

### MacDill AFB photos show how G-E engines, Boeing wing pods, and S.A.C. ground crews have cut bomber maintenance time and costs

A Strategic Air Command B-47 ground crew recently changed a G-E J47 jet engine in 25 minutes. We mention this for two reasons: twenty-five minutes is about *one-eighth* the time it used to take to change a WW II bomber engine. And the 25-minute change is typical of the ways in which the J47's clean design and durability help S.A.C. save time and money.

**Good design: Easy maintenance**

The J47's relatively simple construction makes the engine very easy to maintain, compared to other types of powerplants. For example at MacDill AFB, S.A.C. crews get up to 600 hours from J47's before minor repair. This is nearly twice the minor repair average of S.A.C. piston engines. And naturally the cost of J47 maintenance—and the human effort involved—is less.

**Good design: Long operating life**

Proof of the J47's durability lies in the fact that B-47's attached to the 306th Bombardment Wing have gone more than 600 hours *without a single engine change.* That's the equivalent of 15 nonstop globe encircling flights. A Tampa newspaper has quoted a B-47 ground crew as calling their J47's, "The engines that never quit."

Facts like these illustrate the J47's contribution to the Strategic Air Command. *Section 232-2, General Electric Company, Schenectady 5, N. Y.*

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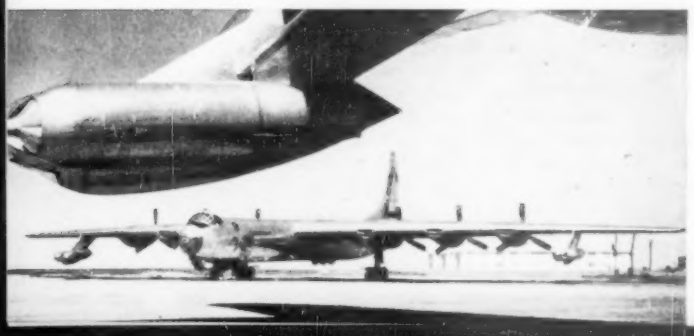
# GENERAL ELECTRIC

**EASE OF J47 MAINTENANCE** is illustrated by this photo of a S.A.C. B-36 outboard wing pod. J47 installation can be removed quickly for minor repair and overhaul.



**LONG J47 OPERATING TIME BETWEEN OVERHAULS** is typified by B-47 No. 12234 of S.A.C. 306th Bombardment Wing. Aircraft flew more than 600 hours without a single engine change.

# Avionics Runs into New 'Sound Barrier'

**● Mysterious malfunctions of tubes and relays are pinned on jet and rocket noise by ARF study.**

Mysterious malfunctioning of avionic equipment in guided missiles and high-speed jet aircraft, often attributed to "gremlins," may be due to high-intensity noise.

The adverse effects of jet and rocket engine noise on humans is well known, but it may prove an even more serious occupational hazard for avionic equipment, M. B. Levine of the Armour Research Foundation told the recent Dayton conference on airborne electronics, in a paper co-authored by F. Mintz, also of ARF.

Avionic equipment designers, still trying to cope with the high temperature, shock, and vibration encountered in missiles and jet aircraft, are therefore confronted with a new problem.

▶ **Tubes, Relays Susceptible**—Armour's limited investigation to date on electron tubes and balanced armature (null-seeking) relays, under Wright Air Development Center sponsorship, indicates that both may malfunction in the presence of engine-generated noise. A reverberant sound chamber, developed by ARF for use in its investigation, was also described by the authors.

The noise level of a jet engine approaches 150 db., measured 10 feet from the tailpipe with the engine operating at full thrust, according to data ARF has obtained. Inside the airplane, where avionic equipment is normally mounted, noise intensity approaches 140 db. (A noise level of 130 db. is the threshhold of pain for the human ear.) The jet engine noise spectrum, showing intensity versus frequency (pitch) of the sound, is shown on p. 53.

These curves, Levine said, represent typical and not worst possible conditions. "The sound intensities encountered are sufficiently high to affect the reliable operation of electronic components, particularly vacuum tubes," Levine noted.

▶ **Tubes Can't Take It**—ARF's tests on the new premium-type electron tubes indicate that when subjected to high-intensity sound, tube noise (microphonism) approaches or exceeds allowable JAN spec limits. Tests were conducted in an ARF-designed sound chamber equipped with a 40-watt loudspeaker excited from an audio oscillator and random noise generator. Armour tested a group of 6J5WGT tubes, connected as capacity-coupled, self-biased amplifiers, with tube operating parameters selected according to JAN specs. the ARF sound chamber measures 6 in. on a side.

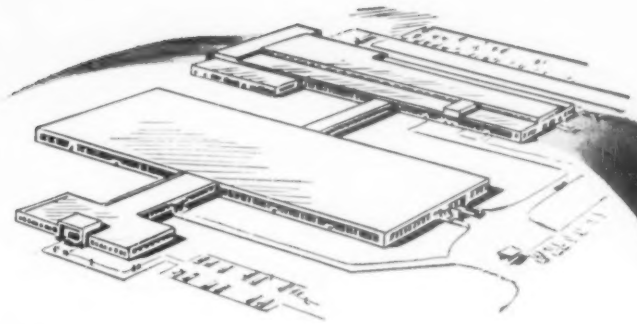
**MISSILE MALFUNCTIONS,** sometimes blamed on "gremlins," may be due to noise.

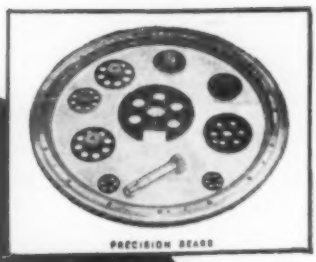
In one test, five tubes were subjected to a 120-db. sound-field, and tube noise output was measured as the frequency of the sound was varied. Although 120 db. is only moderate intensity for jets, microphonic output of all tubes approached or exceeded the JAN spec. value. Test results for three of the tubes (A, B, and C) are plotted on p. 48; results for the other two tubes were comparable to tubes B and C.

▶ **Hidden Resonances Revealed**—Three of the five tubes were mechanically vibrated prior to the noise test, two of them at 5G, one at 10G. During the mechanical shake, all of the tubes showed resonances of the grid support structure (which cause microphonism) at 250 cycles, some at 500 cycles. Under high-intensity sound excitation, these same resonances showed up, along with several others which were not revealed in the vibration tests. Tube A, which was subjected to 10G shake tests, proved particularly susceptible to acoustic excitation, as the curves (p. 48) show.

Although Levine and Mintz caution against any conclusions about the 6J5WGT on the basis of limited tests to date, they do conclude that a microphonic spectrum test run at sound levels of 145-160 db. more closely approaching peaks encountered in missiles and jet aircraft, and would show a marked increase in tube microphonism.

"Of particular interest is the fact that some of the worst resonant conditions occur above the range of the JAN specification for vibration testing





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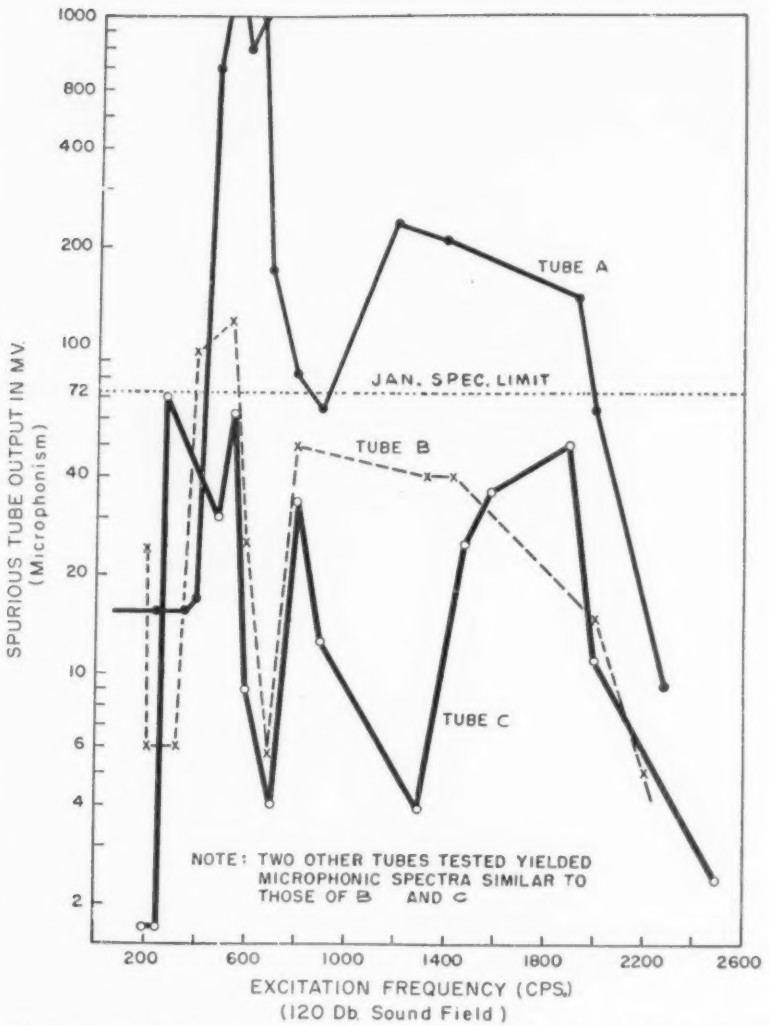
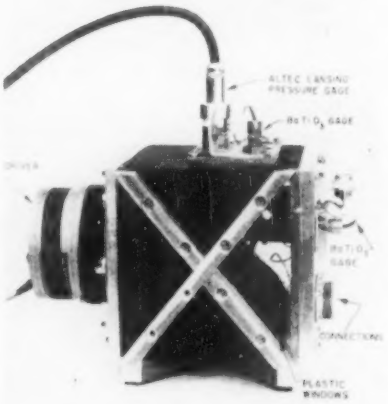



**HIGH-INTENSITY NOISE** causes tubes to produce spurious output signals which can cause serious malfunctioning of missile avionic equipment.



**SOUND CHAMBER** developed by ARF creates high-intensity noise to test effects on avionic component performance.

of electron tubes," the authors note. This suggests that missile equipment manufacturers should set up to test tubes under high-intensity sound fields.

▶ **Relays Too**—Balanced armature relays are used in aircraft and missile applications as power-amplifying devices for servo systems, to eliminate the need for tubes. "The effects of shock and vibration on those sensitive components are generally recognized," Levine pointed out. "Not so well recognized, however, is the effect of high-intensity sound."

A null-seeking sensitive relay consists of two or more control windings, a light armature and two or more sets of contacts. When the control coils have no current or equal currents in them, the armature is balanced in a center position like a teeter-totter, and its electrical contacts are open. When more current flows in one or the other of the coils, the armature swings one

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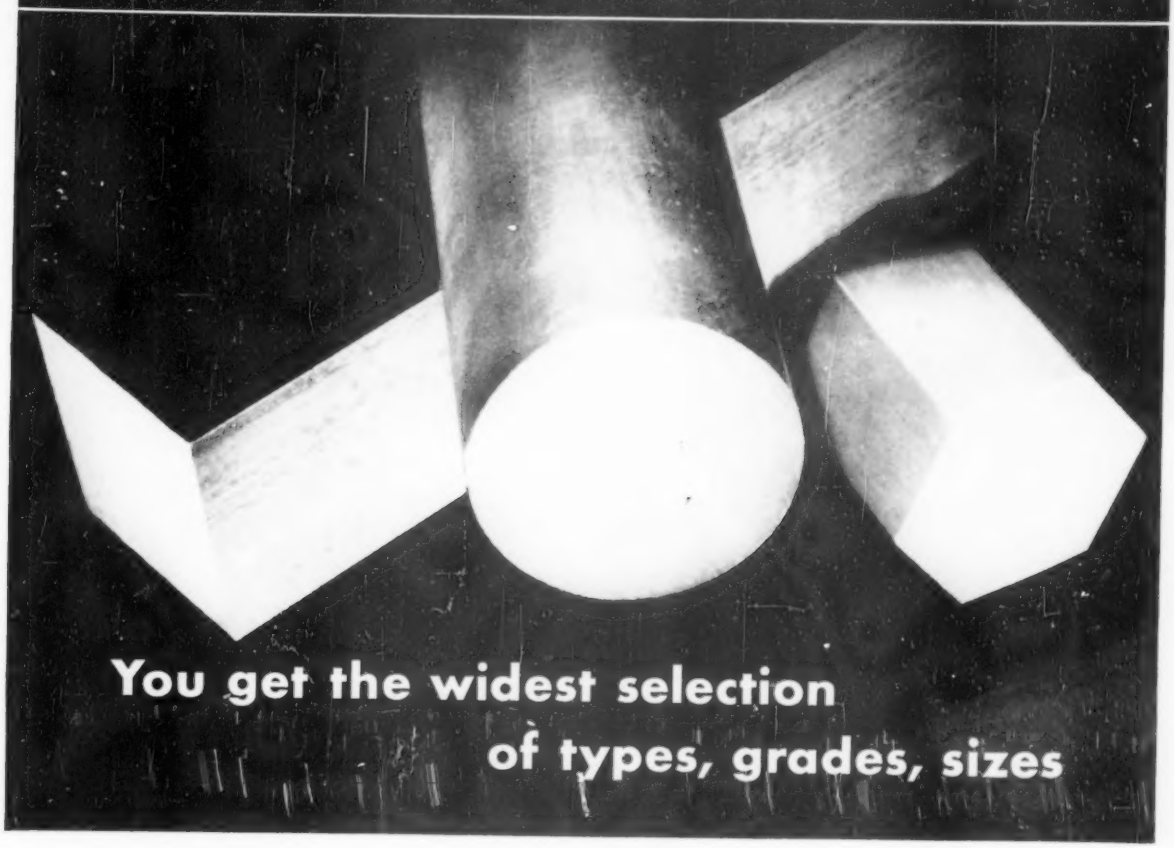


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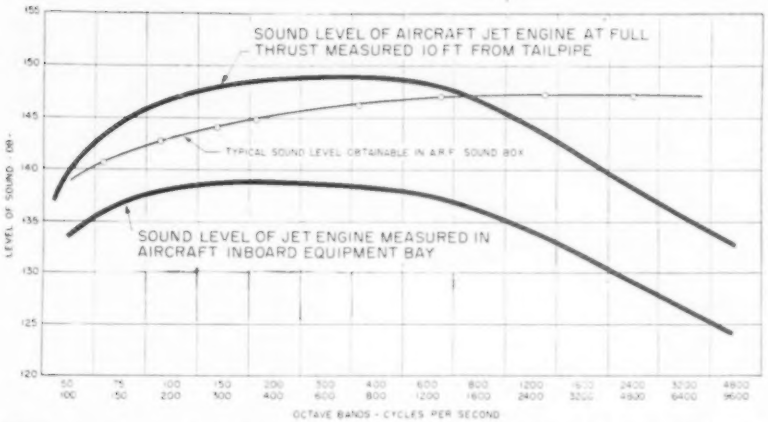



**SPECTRUM** of noise intensity vs. frequency (pitch) produced by a jet engine, inside and outside the aircraft, and noise produced by Armour Research Foundation chamber.

way or the other, closing appropriate contacts. In an autopilot or servo system application, the direction in which the armature swings determines the direction in which the servo motor rotates.

▶ **Erratic Relay Operation**—In ARF tests on sensitive null-seeking relays, it found that 110-db. sound intensity was sufficient to cause disturbance of relay contacts, i.e. increased contact resistance. At certain frequencies, 130 db. of sound was sufficient to cause closed contacts to open.

Thus a balanced relay used to guide a missile might become inoperative or erratic in the presence of high-intensity sound at certain frequencies, yet might operate satisfactorily with noise of the same intensity at other frequencies.

Relay resonances due to sound, and resultant malfunctions, occurred at frequencies of 1,000 to 1,600 cps. and from 2,200 to 2,500 cps., far above the upper limit (55 cps.) specified by MIL specs for mechanical vibration tests on relays, Levine pointed out. The authors urge the use of acoustic tests in evaluating sensitive type relays.

ARF tests on standard relays showed that contact resistance increased in a strong sound field, although not to the point of opening up the contacts.

▶ **Acoustic Chamber Data**—Avionic equipment designers may obtain information needed to build an acoustic chamber for testing components by writing to M. B. Levine, Mechanics Instrumentation & Vibration Group, Armour Research Foundation, Technology Center, Chicago 16, Ill.

—**Philip Klass**

# Avionics Industry Expansions Reported

A new division has been formed by the Sperry Corp. to develop and manufacture microwave tubes, work previously carried on by the Sperry Gyroscope Division. The new Sperry Electronic Tube Division will be housed in a $600,000 facility to be built this year at Gainesville, Fla. First production will be the SAL-39 klystron tubes used in a Navy airborne radar navigation system.

Sperry's new plant is expected to employ 200-300 engineering and production personnel.

Other recent reports on the expanding avionics industry include:

• **Raytheon Manufacturing Co.** recently opened its $2-million electronics lab overlooking Hanscom AFB, Bedford, Mass. New lab, devoted to missiles and radar work, has 100,000 sq. ft. of floor space, will provide room for about 700 employes.

• **General Electric Co.** has broken ground for new plant at Waynesboro, Va., headquarters for its Specialty Control Dept., whose products include aircraft voltage regulators. The move of Specialty Control from its present Schenectady location is part of company's decentralization program.

• **Ryan Aeronautical Co.** has purchased a Goodyear analog differential analyzer at a cost of $58,000 and leased an International Business Machines card program calculator at a fee of $2,800 a month for its newly formed computing section. Computers will be used in Ryan's work on piloted and pilotless aircraft, and electronic guidance systems.

• **Trans-Sonics, Inc.**, will move from Bedford to Burlington, Mass., when its new building, now under construction, is completed. New plant, with 26,000 sq. ft. of floor space, will double existing operating area.

• **International Resistance Co.**, large resistor manufacturer, announces that its wholly owned California subsidiary, Gorman Manuf. Corp., will henceforth be called Ircal Industries.

• **Technology Instrument Corp.** has opened a West Coast engineering facility at 731 N. LaBrea Ave., Hollywood 38, Calif.

• **Bacon Industries, Inc.**, has opened a new department to handle vacuum impregnation of coils, transformers, and other electrical components, both prototype and production quantities. Company's address is 192 Pleasant St., Watertown, Mass.

# Manufacturers Note MW Developments

A small, rugged K$_a$-band klystron, designed for use in missiles and airborne radar, is one of several recently announced microwave components. The new klystron, Type VA-94, developed by Varian Associates, operates in the frequency range of 16 to 17 kmc., provides minimum of 20 milliwatts output and has a 55-mc. bandwidth. Unit weighs 4 oz.; its dimensions are 2x1¼x 1¼ in. Company's address is 990 Varian St., San Carlos, Calif.

Other new microwave components include:

• **Fixed-tuned barretter mount** for use with microwave crystal-mount-type barretters and 1.00x0.500 in. waveguide. Unit contributes a VSWR of 1.5 over the frequency range of 8.5 to 9.6 kmc., according to manufacturer, Airtron, Inc., Dept. A, 1103 W. Elizabeth Ave., Linden, N. J.

• **Radar deflection yokes**, for rotating and stationary types of PPI and rectangular radar scope displays, are now being manufactured by Constantine Engineering Laboratories. Address: Mahwah, N. J.

• **Solid ultrasonic delay lines**, to provide precise delay intervals in radar equipment, operate at 30-mc. carrier frequency, have 8-mc. bandwidth and 26-db. attenuation into 1,000-ohm load. Type SDL-15 has a 3.051-microsecond (1,000-yard) delay; Type SDL-16 has a 6.102-ms. (2,000-yd.) delay. Manufacturer is Bliley Electric Co., Union Station Bldg., Erie, Pa.

• **Rocket-tube cavity oscillator**, Type 192A, employing a Sylvania UHF planar triode tube, provides stable signal source for either continuous wave (CW) or pulse mode. Unit is available for frequencies of 1 to 4 kmc., with tuning range of 400 mc. For pulse operation, unit provides peak power of 200 watts at 2,000 peak volts. For CW use, unit provides average power output of 100 milliwatts at 175 volts. Tuning accuracy, with regulated power supply, is reportedly 0.1%.

Manufacturer is Amerac, Inc., 116 Topsfield Road, Wendham, Mass.

*Aviation Week Picture Brief*

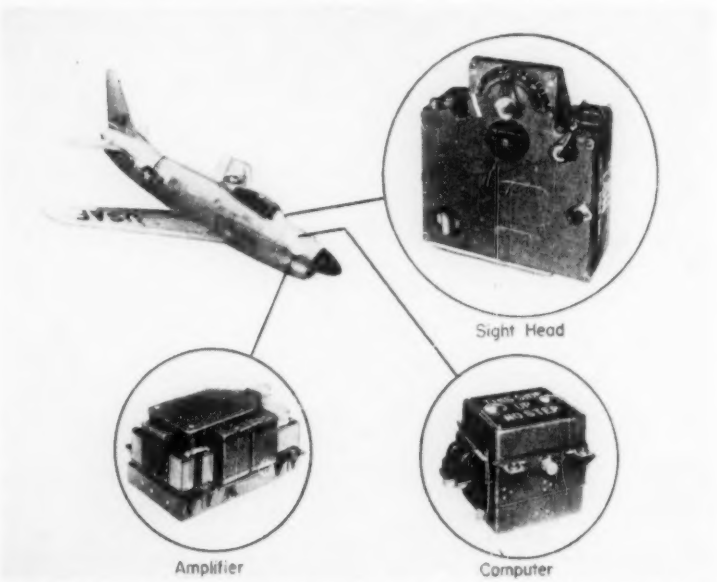
**USAF's A-4** fighter gunsight, shown in F-86, automatically computes aiming point.

# First Photos of A-4 Gunsight

The A-4 computing fighter gunsight, introduced during the last year of the Korean war, was one factor behind the jump in the Sabre's F-86 kill ratio during the closing months. The much improved version of the older A-1 gunsight was developed by Sperry Gyro and manufactured by the AC Spark Plug Division of General Motors, which has held design responsibility since 1951. There are first released photos.

The A-4 gunsight automatically computes where the attacking fighter must be aimed for its weapons (guns, rockets, or bombs) to hit the target, either airborne or ground-based. The computer obtains information on distance to the target from a small radar, developed by General Electric. The pilot need only select desired mode of operation, then keep his gunsight reticle on target.

Against airborne targets, A-4 permits either conventional pursuit-curve type of gunnery run or a straight-in approach, using rockets. A range indicator shows pilot when he is within firing range. When used for bombing, gunsight computer can be set to drop bombs automatically at proper release point.




**GUNSIGHT** consists of a sight head, which projects aiming reticle (crosshairs) on windshield glass; computer, and associated amplifier.

## FILTER CENTER

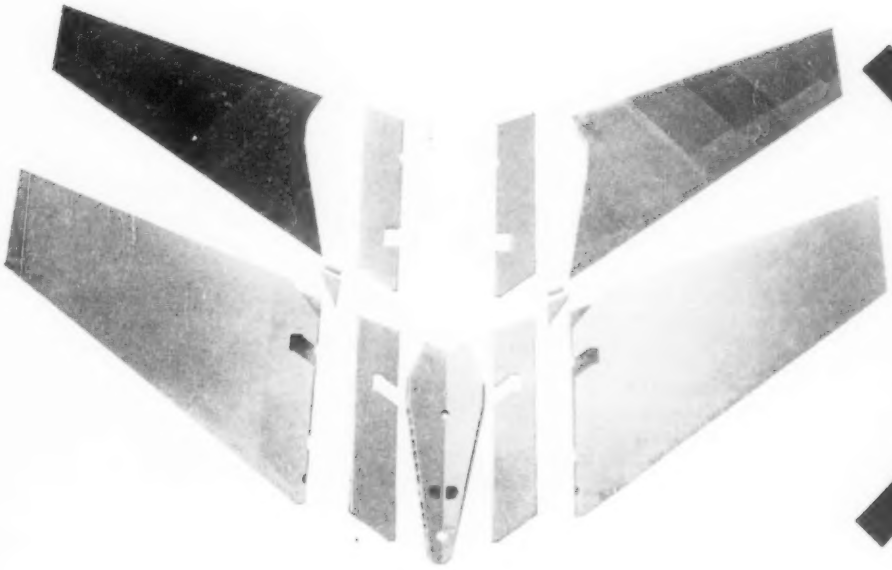
► **Boost Transformer Temperatures**—Bell Telephone Labs have developed techniques and meterials for boosting allowable ambient temperature limit for miniature power transformers to 220-225C, without size or weight increase. Developed under Wright Air Development Center sponsorship, new high-temperature transformers reportedly have dependable life of 1,000 hours. For guided missiles, where long life is not needed, units can reportedly be operated at ambients approaching 300C. WADC project engineer is Eugene Tarrants, Electronic Components Lab, WCREC2.

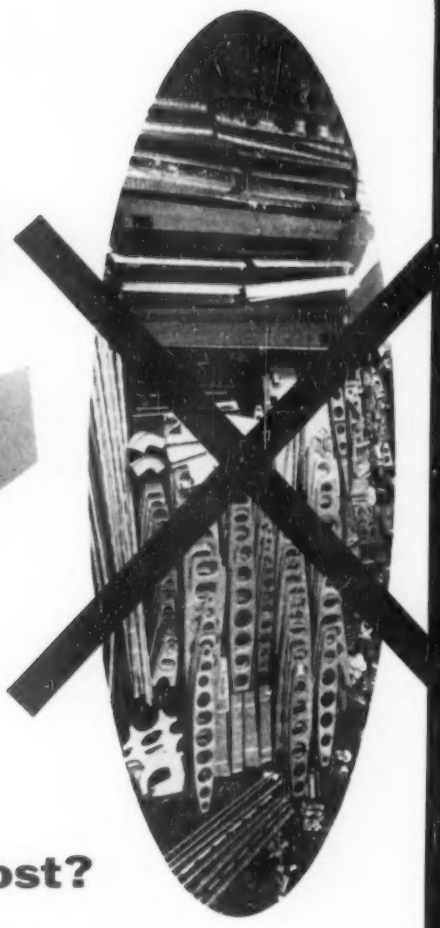
► **New Air Data Computer**—New central flight data computer which produces output signals proportional to angle of attack, angle of sideslip, true airspeed, Mach number, and relative air density, has been developed by Cornell Aeronautical Lab. Unit operates from an external pressure-sensing probe. Prototype model, developed under Navy BuAer contract, weighs 35 lb., occupies 0.85 cu. ft., but CAL engineer Leonard Bogdan says both can be reduced.

► **Avionics Boom Predicted** – Major Alexander P. de Seversky, outspoken proponent of strategic airpower, predicts that U. S. will spend $20 billion on continental defense in the next three years, half of which will go to the avionics industry. De Seversky spoke at a recent New York symposium on "Electronics in Airpower," sponsored by the Mycalex Corp. of America. "Henceforth, the command of the air means not only freedom of air navigation, but also an unimpeded use of electronics," he said.

► **Transistors to the Rescue**—New plug-in emergency transistor amplifier, developed by RCA, prevents loss of vital intercom services in the event an airplane loses its power supply. Designed for use with RCA's military AIC-10 intercom, plug-in unit uses two Type 2N34 p-n-p junction transistors and contains a mercury battery which can power amplifier for 20 hr. of continuous operation and has two-year shelf life. RCA also has designed a transistorized adapter amplifier to permit use of its AIC-10 dynamic mike with older intercoms designed for use with carbon mikes.

► **Collins Autopilot Under Test**—Latest engineering model of Collins Radio's all-magnetic-amplifier autopilot, the AP-101, being developed for the airline market, has been installed in a company airplane for flight test and evaluation. —PK





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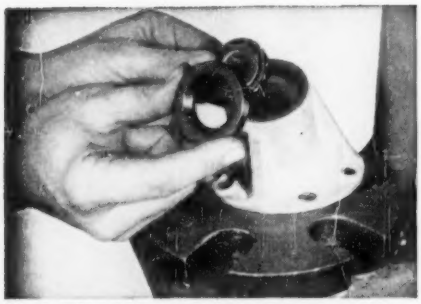
# J-M Clipper Seals fly with the Sikorsky HO5S helicopter...



**Clipper Seal** being installed in the intermediate gear box of the Sikorsky HO5S helicopter to seal oil in, keep abrasives out.

**Photograph and cross section** of Type LPD Clipper Seal. This is just one of numerous styles available to solve tough sealing problems.

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To retain the lubricants vital to its complex rotor and gear systems . . . and to protect bearings against the infiltration of abrasives . . . the new Sikorsky HO5S helicopter depends on these positive sealing qualities of Johns-Manville Clipper Seals.

***Clipper Seals are flexible***—molded of special compounds, they have a tough, dense heel and a soft flexible lip concentrically molded into one piece.

***Clipper Seals reduce friction***—A specially designed garter spring holds the lip in tight but firm contact with the shaft. Thus a positive seal is always maintained but shaft wear is reduced and overheating is prevented.

***Clipper Seals are corrosion-resistant***—The molded body is entirely non-metallic, is therefore unaffected by electrolysis and most forms of corrosion. And the garter spring is available in various corrosion-resistant metals.

***Clipper Seals are versatile***—They can be furnished in flange sections of varying widths to fit practically any cavity. Various lip designs are available . . . and various lip compounds provide the proper hardness for temperatures from −65F to +450F.

To find out more about Clipper Seals and their application to your particular sealing problems, write Johns-Manville, Box 60, N. Y. 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

**Johns-Manville** PRODUCTS for the AVIATION INDUSTRY

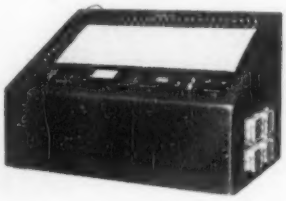
# Devices Analyze Multiple Circuits

Two new testers which can automatically make continuity or short-circuit tests of interconnecting aircraft electric cables or cables prepared by avionic equipment manufacturers, are among several recently announced test devices that are suitable for production-line use.

One of the units, originally developed by Link Aviation to speed the test of the vast number of cables used in its flight simulators, can check a 40-wire cable in eight seconds. The device automatically scans the cable, testing each wire and stopping when it finds a fault.

The device lights a lamp to indicate which circuit is defective. Information is available from Dept. D-2, Link Aviation, Binghamton, N. Y.

The other new tester, called an automatic electrical circuit analyzer, can check up to 200 circuits in 20 seconds, or several units can be cascaded to check up to 1,800 circuits, including an insulation resistance test up to 200 megohms.



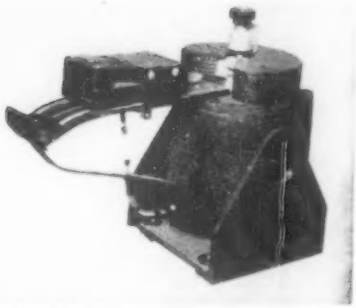
**AUTOMATIC** electric circuit analyzer.

The device can check multiple interconnected cable system, including a functional test of relays, actuators, panel lights, resistors, or other resistance-type devices. Visible matrix type reference chart shows operator which circuit is at fault. In one operation at an aircraft plant, where device was used only four hours per day, an annual saving of $15,000 was indicated, says manufacturer, Electronics Division, DIT-MCO, Inc., 505 W. 9th St., Kansas City, Mo.

Other new production-line testers include:

• **Digital interval timer,** Model 432, for measuring short time intervals to three-place accuracy, has three ranges: 0.01 to 9.99 millisecond, 0.1 to 99.9 ms., and 1 to 999 ms. Device can also be used as a highspeed totalizing counter with a count capacity of 999. Manufacturer is Potter Instrument Co., Inc., 115 Cutter Mill Road, Great Neck, N. Y.

• **Tube vibrator,** Model C-7, for use



**VIBRATOR** for miniature vacuum tubes.

with miniature and sub-min electron tubes or vibration transducers, can deliver a 10-G acceleration to a three-gram load over the frequency range of 200 to 10,000 cps. Accessory amplifier, power supply and oscillator are supplied by company, MB Manufacturing Co., New Haven, Conn.

• **Digital volt-ohmmeter,** Type 48A, automatically measures resistance, voltage and current and gives a decimal indication of their values on a three-decade counter. New Digitester can measure resistance up to 10 megohms in seven ranges, voltages up to 1,000 v. in six ranges, and currents up to one amp. in six ranges. Maximum accuracies (on lowest scales) are 0.01 ohms, 10 microvolts, 0.01 microamp. No accessories or external references are required.

Manufacturer is Telecomputing Corp., 133 E. Santa Anita Ave., Burbank, Calif.

# New Actuator Speeds Plane Servo Systems

A speedy servo actuator for piloted or pilotless aircraft, with a torque-to-inertia ratio of 200,000 rad./sec.$^2$ and an acceleration time constant of 10 milliseconds, according to the manufacturer, is one of several recently announced components suitable for use in servo systems.

The new Model 205 servo actuator, now in production at Sumners Gyroscope Co., consists of a d.c. drive motor, radio noise suppressor, low inertia gear train, and follow-up potentiometer. The model for piloted aircraft also has a disconnect clutch, weighs 4¾ lb.; pilotless aircraft model weighs 4¼ lb. Servo continuous torque output is quoted at 200 in. lb., at 28 v., with stall torque of 1,200 in. lb. Company address: 2328 Broadway, Santa Monica, Calif.

• **Magnetic servo amplifier,** Type 2063-01, weighs under 1 lb., uses two stages of vacuum tube pre-amplification and magnetic output stage. Unit operates from 115 v., 400 cycle power, requires 14 va. at 0.7 power factor. Input impedance is 5,000 ohms. Manufacturer: Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst, N. Y.

• **Long-stroke differential synchro,** Linearsyn Model 7S2, linear-type pick-off, has 4-in. stroke. Output signal is linear with mechanical input throughout full stroke, when excitation voltage is of a 2-10 kc. frequency. Linear range is cut to about 3 inches when excited

## Acoustic Aircraft Detector

Sky watching in comfort is made possible by new acoustic aircraft detector being tested by Air Defense Command. Its range is only slightly better than that of the human ear unaided, but with it Ground Observers may remain inside their observation post in bad weather while their electronic helper remains on duty outside. The device has an indoor amplifier and a buzzer to alert observers when it picks up a plane. Then they go outside for visual spotting. The acoustic detector is made by Telephonics Corp., Huntington, Long Island, N. Y.

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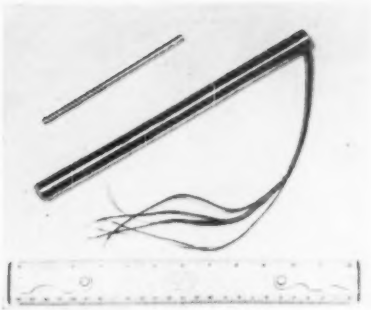


**LONG-STROKE** differential synchro.

from 400 cycles. Output impedance is 1,000 ohms. Manufacturer: Control Components Co., 46 Walnut St., Brookline 47, Mass.

• **Precision gear boxes,** termed virtually friction-free and backlash proof by manufacturer, are available in speed ratios of 20:1 up to 3,125:1 for use in instrument servo systems. Gears are made of aluminum, lubricated for life. Link Aviation, Binghamton, N. Y.

• **Low-inertia servo motor,** Type M-100, two-phase 400-cycle, has stalled torque of 2.7 oz., rotor inertia of 4.0 gr. cm., no load speed of 10,000 rpm., measures 1.75 in. diameter. Operating voltage is 115 v. for the fixed phase, 115/57.5 for the control phase. Unit weighs 12.2 oz. Manufacturer: Infra Electronic Corp., 553 Eagle Rock Ave., Roseland, N. Y.

## Avionics Bulletins

Recently announced technical bulletins and booklets of interest to the avionics field include:

• **Insulated chokes,** Bulletin H-1 (4 pp.), lists application engineering data. International Resistance Co., 401 N. Broad St., Philadelphia 8, Pa.

• **Capacitor catalog,** AC-4, (48 pp.) lists specs on complete line of electrolytic, paper, and metallized-paper capacitors and filters. Astron Corp., 255 Grant Ave., East Newark, N. J.

• **Power supplies,** airborne high-voltage and magnetic amplifier-regulated units, Bulletin MA-154 (4 pp.). Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif.

• **Toroid coils,** for a variety of applications (4 pp.). Torwico Electronics, Inc., 961 Frelinghuysen Ave., New 5, N. J.

• **Selenium Rectifiers,** Bulletin 177 (24 pp.), application engineering data and catalog. Seletron & Germanium Div., Radio Receptor Co., 251 W. 19th St., New York 11, N. Y.

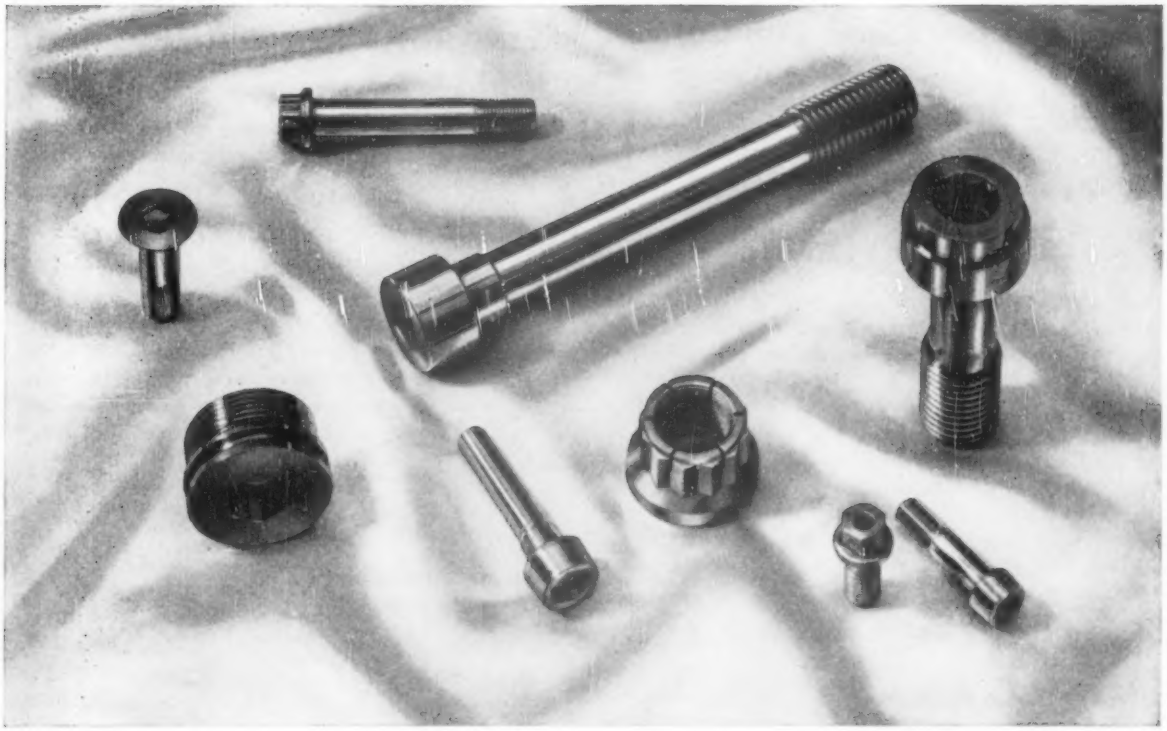
• **Electric tracer control** system for providing automatic control of one or more machine motions, Bulletin GEA-6122 (6 pp.). General Electric Co., Schenectady 5, N. Y.

• **Aircraft stabilization systems** of advanced design suitable for highspeed jet aircraft are described in new booklet available from Minneapolis-Honeywell's Aeronautical Div., 2600 Ridgway Road, Minneapolis 13, Minn.

• **"A Lab Power Amplifier** with Negligible Distortion and Phase Shift Compensation" is the title of Lab Report No. 10 available from Technology Instrument Corp., 531 Main St., Acton, Mass.

• **Interference filters** and RF noise suppression capacitors, 4-page engineering bulletin No. 107, and data sheet No. 108 describing pulse-forming networks and delay lines are available from Micamold Radio Corp., 1087 Flushing Ave., Brooklyn 37, N. Y.

**U.S. Air Force Northrop Scorpion F-89D**
**—twin-jet, all-weather interceptor—**
**uses SPS Precision Fasteners**



A typical selection of SPS Fasteners. For information, write STANDARD PRESSED STEEL CO., Jenkintown 3, Pa.

**AIRCRAFT PRODUCTS DIVISION** **SPS**
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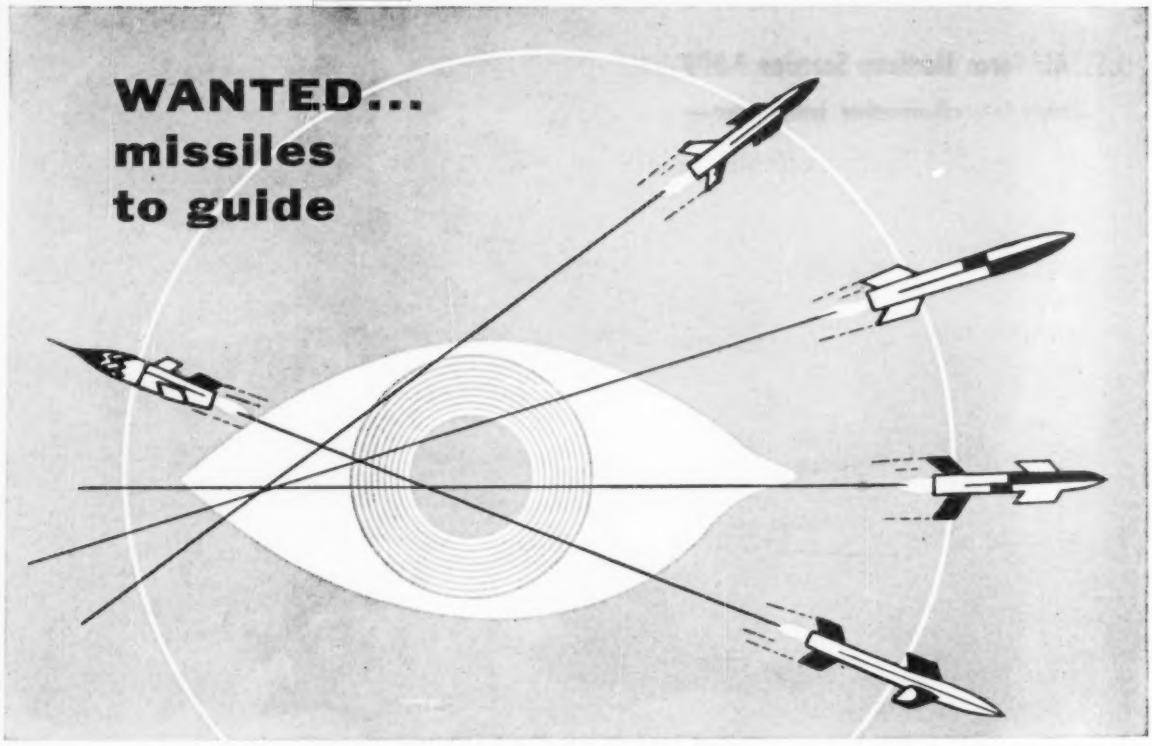


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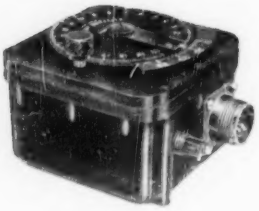

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# LETTERS

## Sir Miles Misquoted

I am to refer to the article in the issue of AVIATION WEEK dated May 3, 1954, in which you criticize Sir Miles Thomas for coining the expression "death ceiling." I have to inform you that Sir Miles Thomas did not, in fact, employ this expression, which I understand was originated by a news agency in a release dated Apr. 9 reporting Sir Miles' statement on the grounding of the corporation's Comet aircraft.

Sir Miles keenly resents the attribution to him of this unfortunate expression. . . .

SECRETARY TO SIR MILES THOMAS
British Overseas Airways Corp.
Airways House, Great West Rd.
Brentford, Middlesex
England

*(The story referred to appeared in newspapers throughout the U. S. AVIATION WEEK is glad to know Sir Miles did not make the statement we referred to.—ED.)*

## Nothing for Reds

I have just finished my "must" reading of AVIATION WEEK (May 31 issue) and naturally am pleased with the mention of Maxson on pages 56 and 80.

Also, wanted you to know that the portion of "News Sidelights" (describing how Russian visitors to a national electronics conference picked up some Maxson literature on a device used in outmoded countermeasures equipment) although correct, may create an erroneous impression. People reading this statement may feel that we were exposing countermeasures data which, as you know, was not the case.

S. MERRILL SKEIST
Vice-President, Contracts
W. L. Maxson Corp.
460 West 34th St.
New York 1, N. Y.

## Robson Reversed?

The question I would like to ask Capt. Robson is . . . What's with this auto-reverse business?

Those doggone propellers (and my letter published in AVIATION WEEK Apr. 12) are causing me to spend time at the typewriter I originally hadn't planned on when I purchased the machine.

Oddly enough, my mail has greatly increased. Like the captain's, comments ranged farther than an ADF needle in a mess of air mass thunderstorms, with a few of them from that well-known axiatrix, A. Nan Emus.

So, without further ado—let's look at this reverse business.

Briefly, the function is somewhat as Robson starts with—throttle lock pins are installed in the pedestal quadrant and are controlled by a solenoid which in turn is operated by that micro-switch on the strut, as Capt. Robson stated. Also, reverse override handles, one on each side of the quadrant so that either pilot can operate them, are mechanically linked to the same throttle lock pins.

Let's backtrack to that micro-switch on the strut for a moment.

As the aircraft becomes airborne, the struts extend and make it impossible for the micro-switch to be tripped. So, in theory, as long as the plane is airborne, no reversal can take place. Also, to protect the "gimmick" from a malfunction, the throttles have a definite detent position, aft of the normal idle position that the throttles must be *forced* into, and brought past to reverse the propellers.

Now for the overrides—

We have previously determined that a micro-switch is installed on a strut which, when the plane's weight has compressed said strut after landing, completes a circuit to the solenoid which releases those throttle lock pins. However, there still is no reversing at this point!

When the landing is assured—somewhat problematical according to the captain—the throttles are moved to the idle position. The detent is felt out, slipped into, and when reversal takes place, the throttles are applied to the rear to get the power into the reversed propellers.

So how about those overrides!

Well, I'm getting to that part of it right now. There have been times, I will admit, when things aeronautical get somewhat out

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of the norm as in an aborted takeoff or a slight case of landing longer than is judicious, for example. The first needs no explanation as it is self-explanatory and if any of the readers fail to understand the second example they are definitely reading the wrong magazine! (Break out the copy of Stick and Rudder.)

In either instance the aircraft is light on the struts and conceivably the micro-switch on the strut already rendering the circuit inoperative. So, the manual override is actuated, by either pilot but preferably the co-pilot, which pulls out the throttle lock pins. A normal reversement is then possible and an embarrassing situation prevented; namely, stopping on property outside the confines of the airport!

Admittedly, the system has at least two flaws—

One is in the same category as that famous gust-lock case of a few short years ago—and the less said about that one the better!

The other is, and I quote from the captain, "a wild cockpit scramble." A cool, planned procedure can eliminate number two—can even be learned in a flight simulator if necessary!

No, captain, I suspect that august body, the CAB, would have denied a certificate to planes with that device long ago if it were as you claim. If you were referring to the electric propeller system, it has been made safe ever since the prop harness was isolated as per CAA orders.

Actually, captain, the system is nowhere near automatic and in the case of the Hamilton installation, is completely manual in every sense of the word. If Hamilton doesn't send you a dash one I will be glad to scout one up for you.

MELVILLE W. MISSALL
Capt., USAF
714 Ruell St.
Houston, Tex.

## Socony's Ads

I feel that Socony Vacuum should be congratulated on the very constructive safety advertisements which I find in AVIATION WEEK. The information on weather is succinct, well presented and informative.

Wish other advertisers would adopt a similarly constructive attitude in their advertisements.

JEROME LEDERER, Director
Flight Safety Foundation, Inc.
471 Park Ave.
New York 22, N. Y.

## Praise

It would be greatly appreciated if you could make arrangements to send 100 reprints of Irving Stone's article on glass reinforced plastic blades which appeared in the Apr. 5 edition of AVIATION WEEK ("Glass-Plastic Blade Passes 100-Hr. Test," p. 43).

Also I would personally wish to thank him for the very good job that he did in covering this subject.

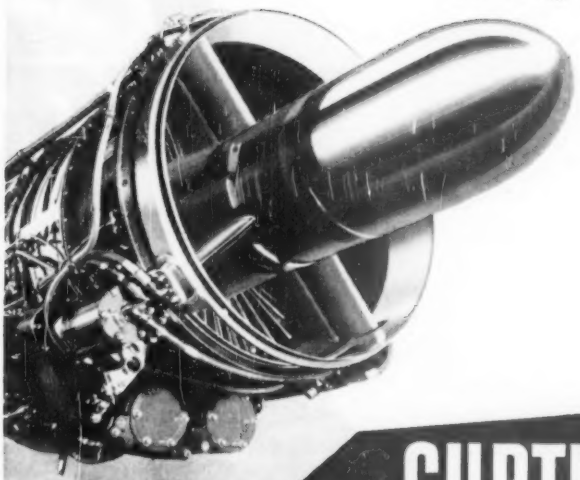
J. W. SACKETT, Plastic Engineer
Thompson Products, Inc.
Jet Division
Willoughby Plant
Willoughby, Ohio

## The U. S. Navy Selects

# J65 JETS

## to power Douglas A4D "Skyhawks"

### over greater distances with more powerful striking loads than any airplane of its type



Midget atom bombers, Douglas A4D Skyhawks deliver superior performance, yet are less than half the size of many current operational jet fighters. Powered by Curtiss-Wright J65 JETS, these bantam attack bombers are capable of carrying atom bombs, rockets, machine guns, missiles or other weapons to suit a wide variety of missions of attack-type airplanes.

The J65 JET which DEVELOPS HIGHER POWER than its announced rating of 7220 lbs. thrust and USES 6 PER CENT LESS FUEL combines outstanding performance today with the demonstrated capacity for power growth to meet the requirements of tomorrow's advanced aircraft.

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**RIDDLE LOADS UP.** Carrier's freight tonnage has risen sharply over last year.

# Riddle Cashing in on Airfreight

By George L. Christian

**Miami**—Business is booming at Riddle Airlines here. The freight carrier in nine months pulled itself out of a $49,000 deficit (in July 1953, first month of its fiscal year) to a $124,000 accumulative profit earned from common carriage freight operations (as of Apr. 30, 1954).

Riddle, which operates U.S. Scheduled Air Cargo Route 109 from New York to Miami to San Juan, is studying the purchase of two C-54s to supplement its current fleet of nine C-46F Curtiss Commandos, of which five are owned outright and four leased from the Air Force. This would permit direct flights from New York to San Juan, which is beyond the range of a C-46.

The company will soon start construction of what it believes will be the first all-cargo terminal building in the U.S. erected specifically for the purpose of handling freighter aircraft, including loading, unloading and storing.

▶ **Yardsticks**—Here are some yardsticks of Riddle's increased activity, comparing April 1954 with April 1953:

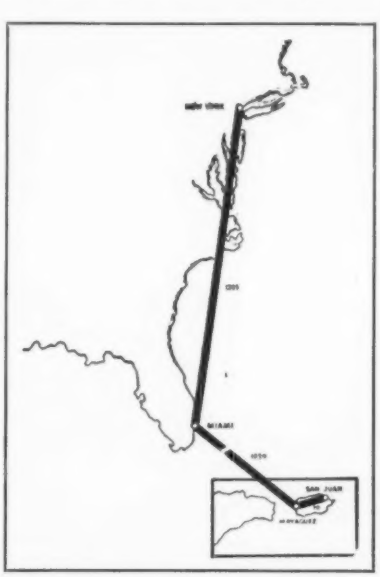
- Gross revenue jumped 33%.
- Number of flights totaled 227 compared to 163, a rise of 40%.
- Flying hours added up to 1,510, an increase of 30%.
- Pounds of freight carried totaled 2,362,009 compared to 1,861,619, a 27% jump.

A new system that enables shippers to confirm freight space in much the same manner that a passenger confirms his seat on an airliner has proved to be very popular with Riddle's customers, the airline reports. This has resulted in increased orders.

The airline has increased its interline agreements from three carriers nine months ago to 21 major airlines today.

▶ **New Broom**—Credit for much of Riddle's improvement is given W. R. Boyd by men around the airline. Boyd, a veteran flyer, took over as president last July. Boyd told AVIATION WEEK that these were the main actions contributing to the upsurge of the airline:

- Efficiency drive that cut the airline's working force from about 300 to 128, yet resulted in greater work production.
- Concentration on "what the airline is in business for—common freight carriage" and the elimination of CAM (Commercial Air Movement) operations, charter transport of military personnel.
- Stepped-up sales campaign to get more and larger shippers.
- Getting good key personnel.




**RIDDLE'S ROUTES.** With C-54s, airline could cash in on authorization to fly New York-San Juan direct.

Boyd says the airline now is solid and the time has come to get larger aircraft with bigger payloads and longer range. This would better its competitive position. Although he has his eye on two C-54s, he speaks wistfully of that unfulfilled dream of many a cargo operator—a good four-engine airplane designed from the drawing board up as a freighter, instead of being a converted passenger craft.

▶ **Improved Performance**—Riddle is modifying all the engines on its C-46s to the R-2800-51 M1 configuration, developed by Air Carrier Engine Service, Inc.

The ACES-modified R-2800 engine should give Riddle's C-46s much better performance, especially when pulling high power from the engines, according to preliminary studies and experience by the airline and other operators who are using it, says Fred J. Brittain, Riddle's chief pilot.

Some of the changes made to the engine:

- Use of forged aluminum cylinder heads with considerably increased cooling fin area.
- Incorporation of later-type cam and valve mechanism.
- Installation of larger-capacity oil pump.
- Modification of the blower section to give more-even mixture distribution to all cylinders.

A check through the log book of the one C-46 ACES modified in May 1954 showed marked reductions in cylinder head and oil temperatures, particularly at takeoff and METO (maximum, except takeoff) powers. Cylinder heads ran at least 30C cooler, dropping from the near-maximum of 230C to 200 or less. On one particular comparison under takeoff power, head temperatures dropped from 205C to 165C. Oil temperatures dropped 10C, from over 90C to 80 or lower.

Several advantages can accrue from these lowered temperatures. Probably the most important is the ability to pull METO power for prolonged periods of time in the case of single-engine operation. The lowered temperatures will undoubtedly reduce the chance of engine failure under critical conditions such as takeoff under full loads. Engine life should be prolonged, reliability increased and spark plug and valve life bettered.

▶ **In the Cockpit**—Riddle has undertaken a C-46 cockpit modernization program. Some changes:

- Grimes rim lights have been installed

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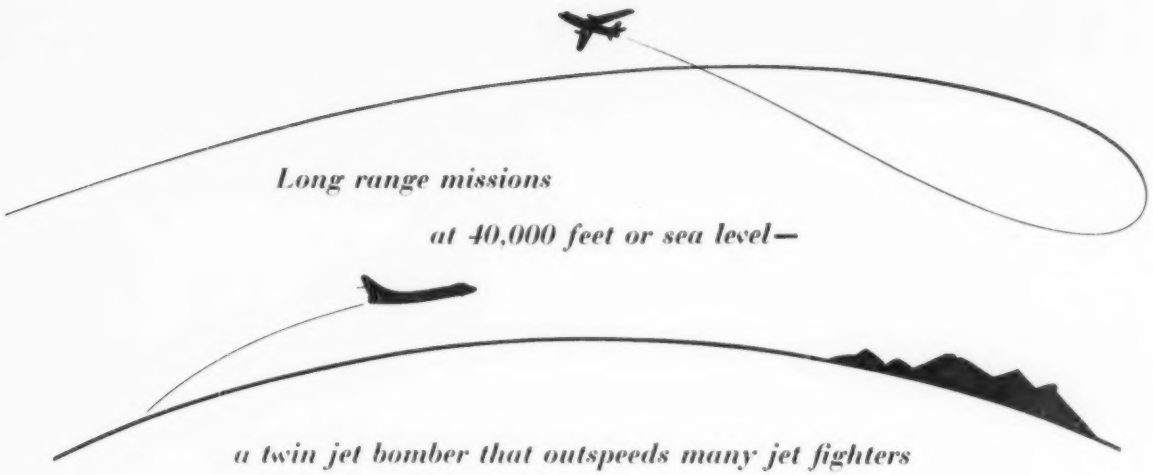


*Long range missions*

*at 40,000 feet or sea level—*

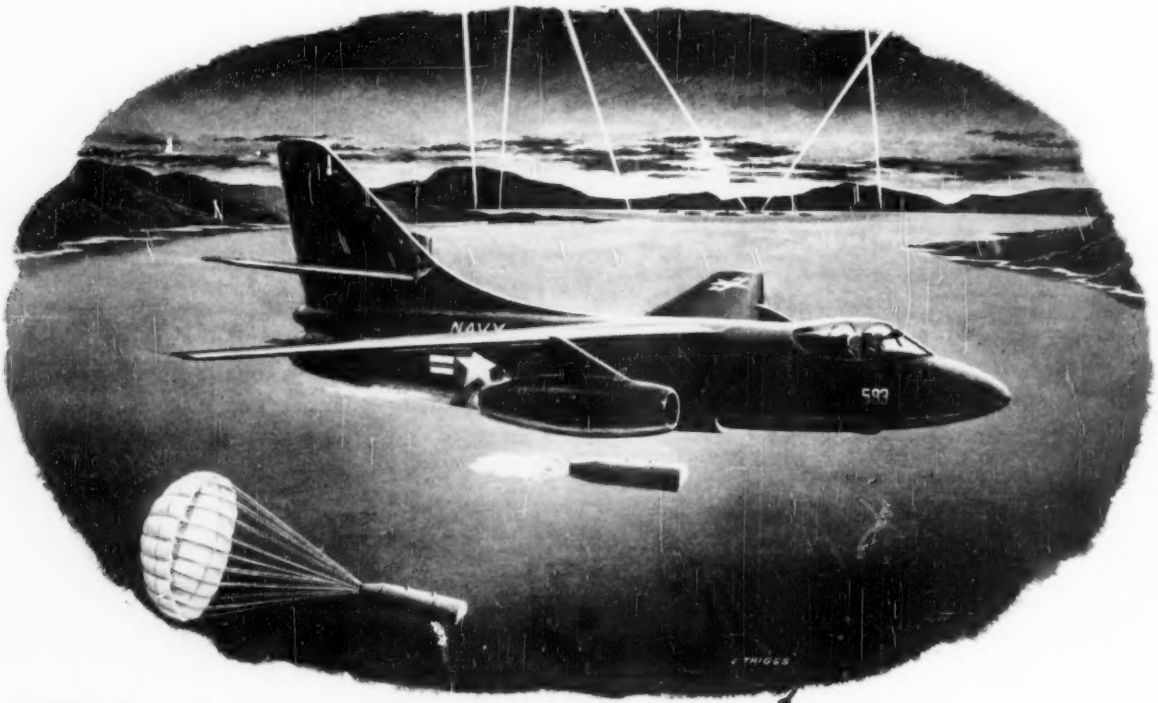
*a twin jet bomber that outspeeds many jet fighters*

## —the U. S. Navy's Douglas A3D

Compact in design, outstanding for its work-weight ratio, the carrier-based twin jet A3D typifies a Douglas-led trend toward less complex combat aircraft.

Simplification, which gives A3D greater speed, range, and payload than any comparable bomber, also results in great versatility. The Douglas A3D can fly high-altitude attack missions or serve as a mine layer. Largest of all carrier-based aircraft, it can handle—in its internal bomb bay—the bulkiest bombs, torpedoes, or other naval munitions designated for carrier action.

Design of A3D is another example of Douglas leadership in aviation. Developing planes that can fly *faster and farther with a bigger payload* is a basic Douglas concept.

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on all flight instruments.

• Radio and avionic navigational aids include omnirange, ILS, dual ADF and RTAI-B high-frequency transceiver for long-range, overwater communications, and a 50-channel ARC-I receiver.

▶ **Freight Only**—Boyd says he is going to operate Riddle strictly as a freight line. He has given up the idea of operating CAM military personnel flights. He will not indulge in a side maintenance setup for overhauling other lines' equipment. He is going to concentrate on hauling any and all kinds of freight his aircraft can carry.

Riddle hauls just about everything: Snakes, tropical fish, clothes "packed on a hangar," needlework, eyeglass frames, handbags, pharmaceuticals, automotive and machine parts. Recently he flew over three freightcar loads of television sets.

▶ **Expanding Agreements**—In July 1953, Riddle had interline agreements with Flying Tigers, Slick and TAN, the Honduran airline.

Today, it has pacts with 21 major airlines, including Pan American World Airways, Scandinavian Airlines System, Braniff International Airways, Trans-Canada Air Lines, United Air Lines, KLM Royal Dutch Airlines, Linea Aeropostal Venezolana, Capital and American Airlines.

▶ **Cargo Building**—Boyd talks with pride about the cargo building and adjoining offices which were specially designed for Riddle's needs. The cargo building, with a total area of 16,000 sq. ft., has been designed to accommodate four C-46s simultaneously for loading or unloading. In addition, there will be a 1,250-cu. ft. refrigerated store room and a 1,250-cu. ft. deep freeze store room.

Special equipment to expedite freight handling includes adjustable-height hydraulic lifts similar to garage grease racks, which will allow tow trucks to drive right into the aircraft to pull cargo in or out, and minimize hand labor.

Construction on the 36th St. side of Miami's International Airport will start soon, Boyd says. Cost will be $216,000 exclusive of refrigeration equipment.

Boyd points out that he is looking for considerable efficiency increases when the new cargo building and offices are completed. This will integrate his layout and staff in two custom-made buildings.

▶ **Here & There**—Riddle does all its own maintenance except for major airframe overhaul and engines. The latter, which are leased, are sent out for overhaul.

At the moment, Riddle is getting 200-205 hours a month utilization out of its fleet of C-46s.

On an overall basis, ton-miles and hours flown have increased more than 20% over comparable figures for last year.

# NEW AVIATION PRODUCTS

## High-Pressure Compressor Is Free of Vibration

Vibration-free operation is claimed for a new high-pressure air compressor developed by Walter Kidde primarily for aircraft use.

The Model 4D compressor delivers 4 cfm. compressed to 3,000 psi. at sea level. The equipment is so precisely balanced, says Kidde, that it will operate at 3,750 rpm. unmounted without creeping. In a redesign from the original production model, weight has been cut down to 7 lb.—a 4-lb. slash—and size has been cut so envelope is 10 in.

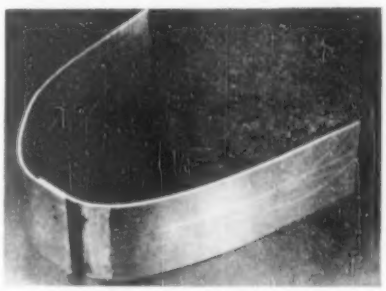
The 4D is a radial, four-stage, piston-type compressor. It can be driven by electric motor, hydraulic motor, direct connection from a reciprocating engine, or by an air turbine in connection with a jet engine.

Walter Kidde & Co., Inc., Belleville, N. J.

## New Adhesives Join Aircraft Materials

Adhesive bonding of aircraft materials gets an assist from two new compounds developed by Rubber and Asbestos Corp. They are designed for bonding metal to metal and metal to plastic.

• Bondmaster M615 is recommended for normal temperature use. It yields shear strength of up to 3,500 psi., peel strength of up to 19 lb., and has exceptional impact strength, the manufacturer says.



**ADHESIVE**-bonded joint maintains 1,500-psi. shear strength at 300F.

• Bondmaster M616, for high-temperature applications, provides shear strength up to 3,000 psi. at 180F and 1,500 psi. at about 300F. It is claimed to maintain very good flexibility at high temperatures.

Rubber and Asbestos Corp., Dept. P, 225 Belleville Ave., Bloomfield, N. J.

## Emergency Air Brake Valve Controls Plane Deceleration

Cornelius Co. has developed a new emergency aircraft air brake valve that is designed to give positive control of deceleration from the plane's cockpit.

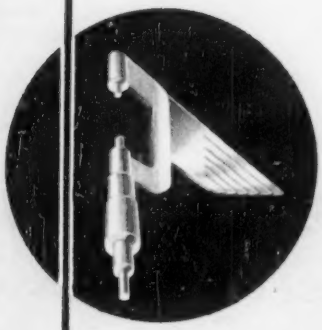
Pilots report an "excellent sense of feel" from the pressure feedback on the unit's control handle, the manufacturer says.

Engineered for use in aircraft pneumatic systems, the air brake valve delivers pressures up to 800 psi. and also is available in modified models capable of providing up to 1,500 psi. The de-

## Lockheed Opens $4-Million Service Base

**Seven Lockheed Super Constellation transports can be housed simultaneously inside this big new aircraft maintenance base opened June 17 by Lockheed Aircraft Service-International at New York's International Airport (Idlewild). Fifteen additional planes can be parked around the facility. Termed the largest independent aircraft service base on the Atlantic Seaboard, it cost $4 million. Suspended cantilever construction provides large clear areas inside. Erected by the Port of New York Authority, the new hangar will be occupied by LAS-I under a 20-yr. lease.**

Hecker



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**VALVE** improves pilot's feel of braking.

vice is designed to receive inlet pressures to 3,000 psi.

Cornelius is marketing the unit as a single-barrel valve (Model 105G500), operated by pedal or hand lever, or double-barreled (Model 105G200), controlled by hand and allowing differential braking.

The manufacturer says the unit can be vented overboard.

Cornelius Co., 550 39th Ave., N.E., Minneapolis, Minn.

## New Bench Center Speeds Inspection of Small Parts

Transicoil Corp. has designed a compact new bench center to simplify and speed inspection of small parts.

The company cites these performance and maintenance features for its new inspection tool, designated the Type YBC-1:

- One-hand adjustment of the live center post, regulated by a sliding fit.
- Removable live and dead centers and a replaceable spring.
- Critical surfaces may be reground to correct for wear.

The bench center weighs 16.5 lb., light enough to be carried to the work. It measures 9 by 5⅞ in., Transicoil reports, and placement of the center post keyway leaves sufficient space for setting up indicating equipment on the tool's base.

The maker says its new product also is ground on all sides to permit a wide variety of setups and checks on all planes, and removable legs allow it to be used with a surface plate or sine table.

Transicoil Corp., 107 Grand St., New York.

## Aircraft Compression Seal Stands Extreme Heat, Cold

A new material of high resilience provides a compression seal for aircraft canopies and hatches at subzero and extremely hot temperatures, according to its fabricator, Arrowhead Rubber Co.

The maker says its new Frigi-flex is resilient, flexible and gives a positive seal at temperatures ranging from −125F to 300F. The company also makes a special type for extreme abrasion resistance that withstands variations within the same range of temperatures.

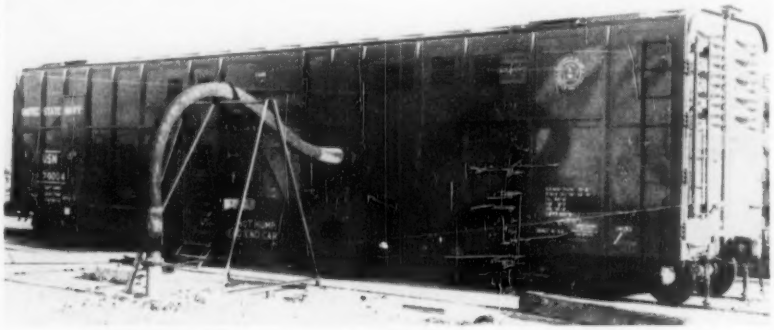
Arrowhead says Frigi-flex is available in sizes to fit specific requirements in experimental or production quantities.

Arrowhead Rubber Co., Long Beach, Calif.

## Spring-Loaded Filler Cap Gives Positive Fuel Seal

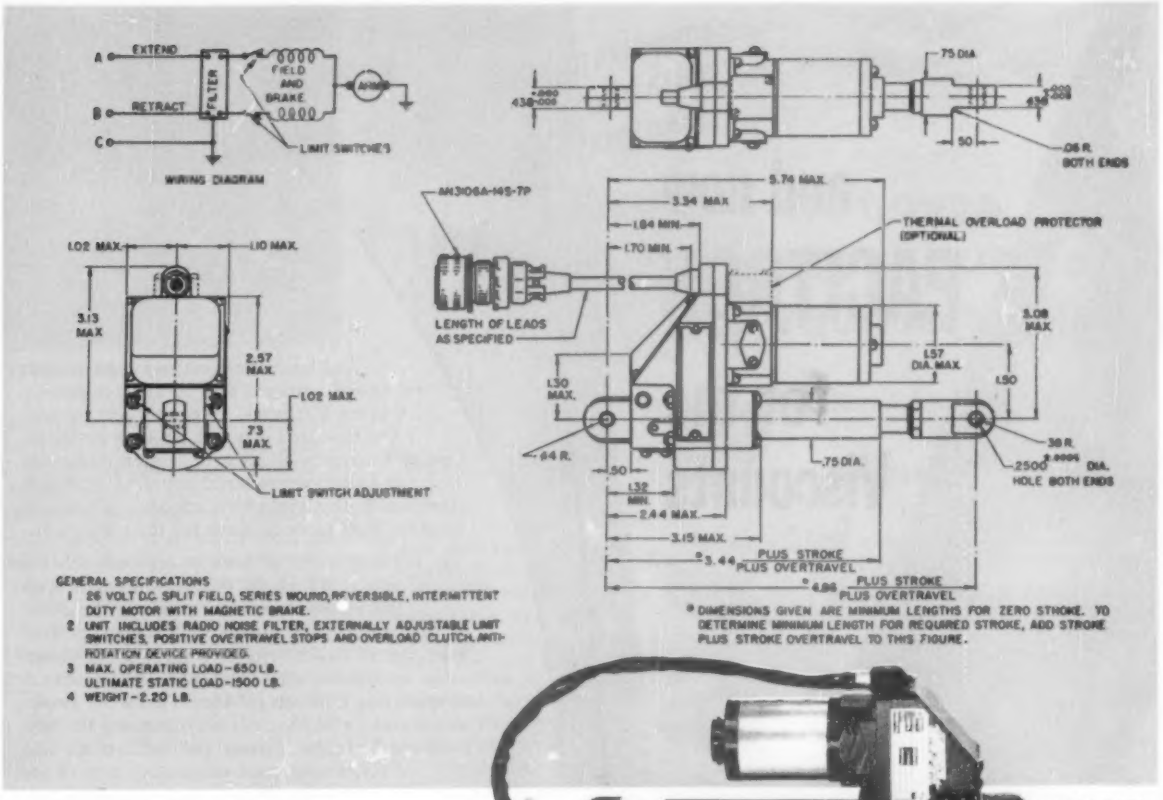
An "accident-proof" fuel filler cap from which gasoline cannot drain or siphon out, even if the top dust cap is left unfastened, is now in production on the West Coast.

The cap, known as the Sacco FV-400



## Heavy-Duty Air Supply Put on Wheels

This special railway box car, fitted with a pair of heavy-duty air compressors able to supply 5,000 cu. ft. per minute at 125 psi. has been built for Navy's Bureau of Ships and Docks to supply emergency air supply at important installations where normal facilities cannot handle the job or are out of action. The builder, Clark Bros. Co., Olean, N. Y., expects this type of unit to be used extensively by Air Force, Army, Navy and private industry because of its emergency value and since it would provide considerable economies where need for large compressed air supply is temporary. In use, the car is clamped to the rails and jacked to provide rigidity.




GENERAL SPECIFICATIONS

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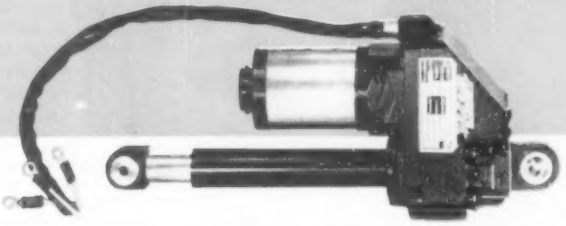
2. UNIT INCLUDES RADIO NOISE FILTER, EXTERNALLY ADJUSTABLE LIMIT SWITCHES, POSITIVE OVERTRAVEL STOPS AND OVERLOAD CLUTCH. ANTI-ROTATION DEVICE PROVIDED.
3. MAX. OPERATING LOAD – 650 LB. ULTIMATE STATIC LOAD – 1500 LB.
4. WEIGHT – 2.20 LB.

* DIMENSIONS GIVEN ARE MINIMUM LENGTHS FOR ZERO STROKE. TO DETERMINE MINIMUM LENGTH FOR REQUIRED STROKE, ADD STROKE PLUS STROKE OVERTRAVEL TO THIS FIGURE.



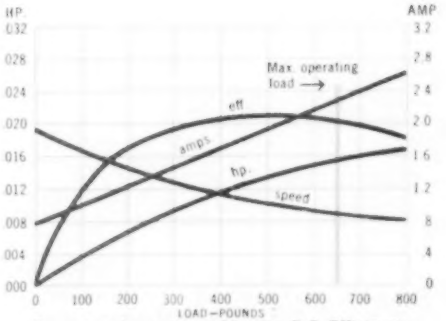
Model R-570
Linear Actuator

# READ THIS BEFORE BUYING YOUR NEXT ACTUATOR

Here are three questions to answer before you settle on any one actuator —whether it be for ailerons, feel system, cowl flaps, or any of a hundred other applications:

1. Will it materially increase pilot efficiency, safety, comfort?
2. Is it consistent with airframe design in weight and size?
3. Will it meet your standard of reliability?

Our R-570 Linear Actuator answered these questions recently for a leading manufacturer of interceptors. In addition, his design posed the problem of extremely constricted operating space. The first R-570 was produced and delivered inside of two weeks. It may be just what you're looking for. If not, we can supply—or design—an actuator that will.

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on the Airborne line of electro-mechanical actuators is contained in our new aviation catalog. Send for your copy today.

# and now PACITRON* for the Viscounts

Capital Airlines is making news with its recently ordered fleet of made-in-Britain Vickers Viscounts. Later this year, Trans-Canada Air Lines will put into service its fleet of Viscounts—the first turboprop transports to go into commercial operation in North America. Both airlines have specified Simmonds Pacitron Fuel Gage Systems for their Viscounts.

In addition to the ultimate in accurate, reliable gaging of available fuel, the Pacitron installation on the Viscount includes gaging of the water methanol system, as well as provision for load limit control (i.e. automatic control of fuel taken aboard in accordance with flight plan requirements.) In specifying Pacitron for their Viscounts, Trans-Canada and Capital are not only selecting the best available fuel gage systems, both airlines are also confirming their satisfactory experience with prior Simmonds fuel gage installations.

In sum, Pacitron for the Viscounts is further evidence of the reason why Simmonds fuel gages today are flying on more than 70 types of aircraft and with more than 30 U.S. and foreign flag airlines.

**NOTE: Airline executives and engineers are invited to write for the newly published brochure "Fuel Gaging for Transport Aircraft".**

*Pacitron is a U. S. trademark

The Extra Engineer—When Pacitron fuel gage system provides fuel management as well as fuel measurement.

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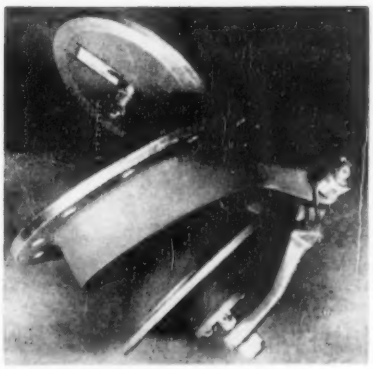

**SAFETY CAP** keeps fuel in gas tank.

recently passed Air Force requirements under MIL-C-7244, Type III, and is now going into production aircraft at Lockheed Aircraft Corp.

Closure is provided by a patented, self-aligning seat that will always give a perfect seal, according to the manufacturer. Semi-spherical internal trapdoor seal is springloaded to remain closed except when fuel nozzle is inserted in tank. The greater the internal pressure, the tighter the seal is said to be. The cap has been tested to 250 psi. without leakage or failure. It fits standard 4-in. AN mountings and weighs 1¼ lb.

Santa Anita Engineering Co., Pasadena, Calif.

## ALSO ON THE MARKET

**Self-cleaning dust collector** will handle all types of dust, including abrasive and fibrous materials. Called Cyclo-Filter, it embodies reverse air jet which intermittently blows clean air through cloth filter tubes, loosening dirt which might otherwise clog them. Cyclo-Filters come in three models, ranging from 400-cfm. to 5,000-cfm. capacity. They are approximately 4 ft. in diameter and require from 11 to 15 ft. headroom. —Torit Manufacturing Co., 271 Walnut St., St. Paul 2, Minn.

**Centerless marking device** is designed for precision calibrating, marking and brand labeling of manual dials, shells, gas bottles, tapered cylinders and similar products. Called Micro-Marker, it fits any standard marking press utilizing the drawbar principle and incorporates ball-bearing cradle on which part rotates. Maker recommends it particularly for thin-walled or highly polished surfaces and when stress and plastic flow must be minimized. A mark as slight as .003 in. will register.—Acme Marking Equipment Co., Dept. 129, 8030 Lyndon, Detroit 38, Mich.


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New designs are more compact, have low weight, longer service life, less maintenance, easy installation characteristics plus *proven operating efficiency.*

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Write for new, descriptive Brochure containing detailed information on ADEL'S line of Aircraft Equipment and facilities. Address ADEL DIVISION, GENERAL METALS CORPORATION, 10775 Van Owen St., Burbank, Calif.

**ADEL** TYPICAL 3000 AND 1500 PSI, NON-INTERFLOW 4-WAY DISC TYPE SELECTOR VALVES

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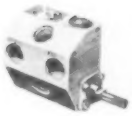

**ADEL** TYPICAL 1500 PSI, 4-WAY POPPET TYPE DIRECTIONAL CONTROL VALVES

**AN6210-1 and -2, AN6211-1 and -2**

**ADEL** TYPICAL 3000 AND 1500 PSI, SHUTTLE VALVES—AN APPROVAL ON ALL DASH NUMBER VARIATIONS

**AN6209, AN6217, AN6277 and AN6278**

**ADEL** TYPICAL 3000 PSI, ADJUSTABLE, POPPET TYPE RELIEF VALVES

**AN6279-4, -6 and -8**

**ADEL** TYPICAL 1000 TO 2100 PSI CRACKING PRESSURE, THERMAL RELIEF VALVES

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**ADEL** TYPICAL 1500 PSI, POPPET TYPE CHECK VALVES

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**ADEL** TYPICAL 1500 PSI, ADJUSTABLE, PISTON TYPE RELIEF VALVES

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**ARC Type 15D VOR** Receiving Equipment is four pounds lighter and has one less major unit than previous models. It fills the vital need for static-free communication and navigation facilities, and is ideal for dual omni installations on aircraft where simultaneous reception from two stations is a requisite, and where weight and space must be conserved.

With the 15D you can fly any track on the omni ranges, obtain a precise "fix" on two or more omni stations, make runway localizer approach, and receive weather and other voice signals on the same frequency that localizer or range signals are being received.

Receiver is tunable, covering entire band allocated to above services (108-135 MC).

The 15D equipment is sold and installed by ARC dealers, who will be pleased to quote you on a single or dual installation in your aircraft. The price of each 15D is $1,823.00 f.o.b. Boonton, N. J., plus installation charges. Write for technical bulletin and name of your nearest ARC dealer.

ARC
Dependable Airborne Electronic Equipment Since 1928
Aircraft Radio Corporation
BOONTON NEW JERSEY

# AVIATION SAFETY

*CAB Report on AAT Crash Indicates . . .*

## Icing, Turbulence Downed C-46F

### THE ACCIDENT

At approximately 0412 MST,[1] Jan. 7, 1953, an Associated Air Transport Curtiss C-46F aircraft, N 1648M, being operated as Trip 1-6-6A, CAM, No. 4355],[2] between Seattle, Wash., and Fort Jackson, S. C., crashed approximately eight miles west of Fish Haven, Ida. All 40 persons aboard, consisting of 37 passengers, all military personnel, and a crew of three lost their lives, and the aircraft was completely demolished.

### HISTORY OF THE FLIGHT

Trip 1-6-6A originated at Boeing Field, Seattle, Wash., with the first stop scheduled at Cheyenne, Wyo. The crew consisted of Capt. Lawrence B. Crawford, First Officer Maxwell F. Perkins and Stewardess Marie Davis. Prior to departure the aircraft was serviced with 738 gallons of fuel and 20 gallons of oil, bringing the total on board to 1,020 gallons of fuel and 60 gallons of oil. Pre-flight inspection was performed by the crew. The gross weight of the aircraft at departure was 45,401 lb. or 401 lb. over the maximum allowable gross weight of 45,000 lb. authorized for passenger operations[3], the distribution of the load on board, however, was within the prescribed center of gravity limitations.

Weather briefing of the crew by the United States Weather Bureau at Boeing Field indicated en route weather to be scattered to broken clouds to overcast with the tops estimated at 12,000 feet and a Cheyenne Terminal Forecast of scattered clouds at 15,000 feet, visibility of more than 15 miles. The weather briefing included a forecast of icing conditions in clouds and precipitation above 6,000 feet along the route, with cloud tops ranging from 10,000 to 14,000 feet MSL.

An IFR (instrument flight rules) flight plan, filed by Capt. Crawford and approved by the Civil Aeronautics Administration Air Route Traffic Control, Seattle, requested a cruising altitude of 13,000 feet to Cheyenne via Airways Green 2, Blue 12, Blue 32, Red 1, and Green 3, with a proposed true air speed of 200 mph., estimated elapsed time five hours, with six hours and 40 minutes of fuel aboard, alternate airport, Denver, Colo.

The flight departed Boeing Field at 0050 and made the required position reports along the route, with no mention of any irregularities, reporting over Malad City at 13,000 feet, time 0358, and estimating Rock Springs at 0445.

There were no further radio contacts with the aircraft. All attempts to contact the flight by CAA radio stations and by other aircraft along and bordering the proposed route were unsuccessful. A widespread search for the missing aircraft was subsequently conducted under the supervision of Air Search and Rescue units of the United States Air Force.

### INVESTIGATION

Five days later, on Jan. 12, 1953, at 1320 hours, the wreckage was sighted from the air by a Civil Air Patrol pilot. Two Air Force paramedics parachuted to the scene and immediately confirmed the aircraft's identity and determined that there were no survivors.

During their observation of the wreckage area, a strip of hard ice was noticed on the leading edge of the de-icer boot of a partially exposed wing. This piece of ice was adhering to the boot, parallel to the leading edge and was about three feet long and uniformly about 1½ inches thick and about ¾ inches wide.

Both ends of this strip appeared to be blunt. No other ice was seen on the aircraft wreckage.

On Jan. 13 and 14, a military search party and Board investigators reached the crash site. It was agreed to by all concerned that it was impossible to find and identify the bodies or to conduct a detailed examination of the wreckage because of extremely deep and heavily drifted snow.

The military established and maintained a guard of the crash area until June 20, 1953, when recovery operations were completed and the last of the bodies had been removed.

The investigation at the scene of the accident revealed that the initial impact occurred when the aircraft, traveling on a heading of about 340 degrees and nearly level longitudinally, struck a small pine tree at an altitude of approximately 8,545 feet, 45 feet south of an 8,500-foot east-west ridge, and continued 377 feet in a nearly level attitude where contact was made with two large pine trees. At this point several small bits of wreckage, including chips of propeller blades, were recovered. The aircraft continued on the same heading (340 degrees), striking another large pine tree 242 feet beyond and approximately 75 feet lower. From this point, the aircraft began to disintegrate as it continued down the slope at an approximate 50-degree angle shearing numerous trees.

Contact with the ground was made at the base of the hill at the north end of a 93-foot ravine where the aircraft gouged three large holes in the ground.

The aircraft then continued up a 32-degree rise approximately 200 feet where the tail section came to rest. Several components of the wreckage continued over this

[1] All times herein are Mountain Standard Time based on the 24-hour clock.

[2] CAM is the designation of Commercial Air Movement flights which are arranged by contract between the military and air-carrier operators.

[3] See CAB Special Regulation No. SR-379, adopted Jan. 31, 1952.

# *The Cessna "Bird Dog" is a Pack Horse, Too!*

Cessna
AIRCRAFT COMPANY

Supplying small Army units by air is a tough, dangerous job frequently assigned to Army aviators flying Cessna L-19's. These rugged airplanes can carry and drop up to 500 lbs. of food, clothing, ammunition, weapons and medical supplies. In serving the needs of 7 basic Army branches, they also supply many *intangibles* . . . "eyes" for the Infantry and Artillery, better communications for the Signal Corps, traffic control for the M.P.'s, fast transportation for field commanders and V. I. P.'s. In combat, in camp, L-19's have proved their ability to take it. Cessna has been delivering them to U. S. armed forces *on schedule* for 4 years.

## Easiest to Service

Even in zero temperatures, under punishing field conditions, all-metal Cessna L-19's are easy to service, require less maintenance than any other airplane used by the Army!

## Help 'on the Wing'

Supply packs, snapped to the wings of waiting L-19's are on their way to distant troops *in seconds!* Other uses of these versatile army airplanes: wire laying, flare dropping, aerial photography, insect spraying, courier work. L-19's are also used by U. S. Marines, the Army National Guard and are available to state governments for emergency use.

CESSNA AIRCRAFT COMPANY, WICHITA, KANSAS

hill approximately 350 feet. The wreckage was distributed over an area approximately 400 feet wide and 1,540 feet north from the point of initial impact.

Time of the crash was determined by impact-stopped watches as close to 0412. The location was 42° 04′ North latitude 111° 32′ West longitude.

Two oxygen bottles were found at the scene of the accident. Although the main valve on each cylinder was closed, both pressure gages and output control valves were broken off. One bottle was completely charged, while the other, which was badly damaged, was partially discharged. Thus, it is evident that there was no shortage of oxygen supply.

Examination of the widespread and scattered wreckage yielded no clue or even suggestion that there had been structural or mechanical difficulty of any nature before impact. Further, the relatively flat angle of impact is indicative of partial control at the time the aircraft struck. There was no evidence of any fire or explosion before the crash.

Examination showed that both engines were rotating at the time of impact and that the propellers were in the cruising rpm. range which definitely indicated that power was being developed at impact. Damage was so extensive that it was impossible to follow through on the continuity of all control systems; however, those portions of control systems that could be examined were found to be properly fastened and safetied.

The aircraft was equipped with wing de-icer boots but the cockpit unit controlling their use was not recovered. However, investigation disclosed that the de-icer boots were operative when checked at Boston on Jan. 4, 1953, three days prior to the accident. Due to the forecasted icing conditions en route to Cheyenne, it is probable that the pilot checked the aircraft's de-icer equipment prior to departure from Seattle in accordance with standard operating procedure. Also, the propellers were equipped for de-icing, and the 20-gallon anti-icer tank, supplying the propellers, the carburetor and the windshields, was full of alcohol when the aircraft left Cheyenne for Seattle on Jan. 5, 1953.

The Board's investigation also disclosed that all the required items of navigation equipment were aboard the aircraft, and that the flight log found at the scene had been maintained with the last position entry over Malad City at 0358. It revealed no discrepancies. The indicated times over stations along the route coincided with reported times as recorded by the CAA radio stations.

According to company records, Capt. Crawford and First Officer Perkins were both well qualified on C-46 aircraft, and were thoroughly familiar with the de-icing equipment and its use. A company official testified that both had flown the route involved about 12 times during the year preceding the accident and were therefore familiar with terrain elevations. Investigation disclosed that both Capt. Crawford and First Officer Perkins had received their required rest periods prior to departure from Seattle.

## ANALYSIS

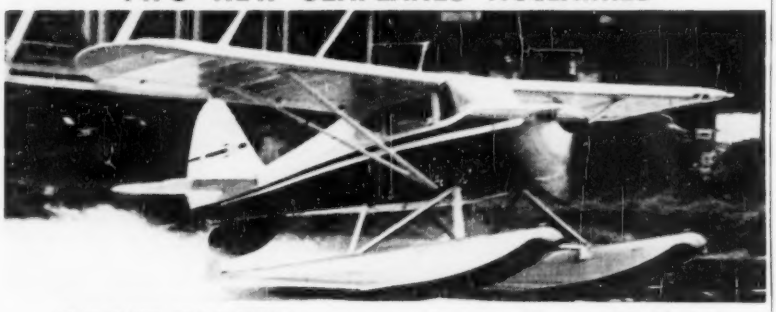
Had the flight continued on from Malad City at 13,000 feet, it would likely have entered the tops of the clouds over the mountains between Malad City and Bear Lake.

During this short period that the flight would have been in the clouds, light rime ice and light to possibly moderate turbulence would have occurred. It is probable that the top portion of these clouds were predominately ice crystals, and that therefore sufficient water in the liquid state would not have been present to produce more than a light coating of ice. It seems likely that even this condition could have been flown over by an increase of altitude of not more than 500 feet. These conditions were verified by another flight that preceded N 1648M by only a few minutes without any difficulty. There was no request received from the flight for a higher altitude. (Any change of altitude would require clearance from Air Route Traffic Control.)

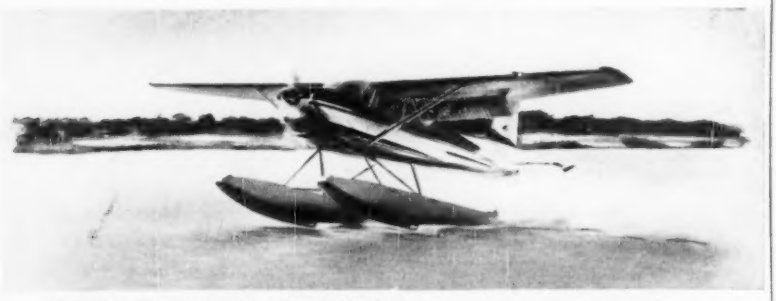
Since the above conditions did exist at the time the flight was in the area, it is likely that an involuntary descent was made into an area of increasing ice and turbulence which extended two or three thousand feet above the mountains. The mountains between Malad City and Bear Lake range from 8,000 feet to in excess of 9,000 feet. The westerly winds were lifting the moist unstable air over those mountains, producing zero ceilings, moderate to severe turbulence, moderate to heavy icing and snow, with updrafts on the windward side of the slopes and downdrafts on the leeward sides. Ground observers in that area, none of whom saw any aircraft, described conditions as a blizzard. This was a local condition


NEWS Edo NOTES

TWO NEW SEAPLANES ACCLAIMED



THE PIPER TRI-PACER is now approved as a seaplane on Edo Model 2000 floats. As a result this popular four-place aircraft can now be readily converted to water flying. Edo Model 2000 floats are also approved on the Piper Super Cub and Cessna 170, and are available for immediate delivery from stock.



PROVING UNUSUALLY POPULAR as a seaplane is the 225-horsepower Cessna 180 on the new Edo Model 2870 floats. These new, improved floats have greater buoyancy yet are priced $1605 lower than the Edo 2425's previously used on the 180.

Edo Since 1925

Your own airplane may prove more useful or enjoyable on Edo floats. Why not investigate water flying by flying floats this summer. See your nearest seaplane operator.

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# *Complete* RELIABILITY...

## first essential in aircraft electronics

Engine-control electronic equipment is frequently installed in close proximity to the turbojet engine. Therefore, electronic components must be designed and constructed to function with *complete reliability* under extreme ambient conditions. However, the degree of reliability attained depends largely upon the attention given to detail in applying these five major design principles to every phase of equipment development:

1. Conception of basically simple circuitry to accomplish desired control functions.
2. Rugged design of mechanical details.
3. Selection of components based upon extensive environmental and life tests.
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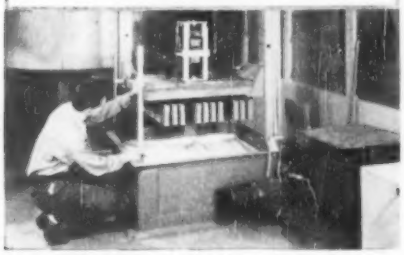
5. Adequate performance tests of production units under dynamic operating conditions.

Strict adherence to these principles has enabled us to achieve extreme reliability in all our aircraft electronic equipment. We believe our years of concentrated research, development and tests devoted exclusively to automatic control systems for jet engines can be of real value in solving your control problems. Our engineering counsel and extensive manufacturing and test facilities are at your service. We welcome your inquiry.

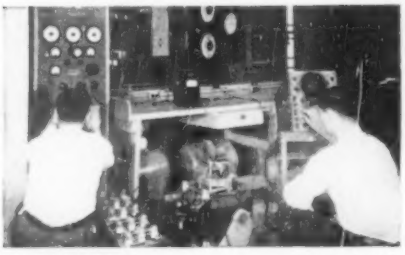
**TEMPERATURE CONTROL AMPLIFIER** *(Illustrated above)*. Modulates exhaust nozzle area of a turbojet engine to maintain a constant turbine exit temperature. Input signal is derived from thermocouples. Output controls a servo which supplies hydraulic power to the exhaust nozzle positioning actuators.

**TEST SPECIFICATIONS.** **MIL-E-5009A:** Altitude, ignition proof, sand and dust, humidity, sustained acceleration, impact. **MIL-E-5272A:** Salt Spray. **MIL-E-5007A:** General specification. **MIL-I-6181:** Radio interference.

**SIMULATED OPERATING CONDITIONS PROVE COMPONENT PERFORMANCE**

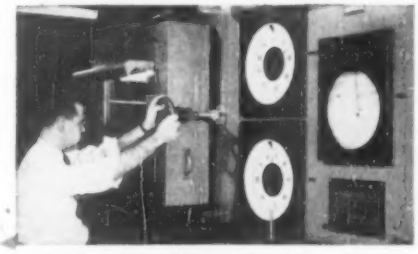


**IMPACT.** Unit must withstand impact shocks of 30g for a time duration of not less than 10 milliseconds.



**VIBRATION.** Operational accuracy guaranteed at 5g from 20 to 55cps and at 10g from 55 to 225cps.

**SUSTAINED ACCELERATION.** Unit must operate satisfactorily while subjected to sustained acceleration of 8g along its longitudinal axis, 10g along its vertical axis, and 5g along its horizontal axis.



**FLIGHT TEST CHAMBER.** Unit performance checked under simulated flight conditions within a temperature range of minus 65° F. to plus 200° F., a relative humidity of 95%, and at all altitudes up to 50,000 feet.

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OUR AIRCRAFT PRODUCTS INCLUDE: TURBOJET ENGINE TEMPERATURE CONTROL AMPLIFIERS • ELECTRONIC AMPLIFIERS PRESSURE SWITCHES FOR ROCKETS, JET ENGINE AND AIRFRAME APPLICATIONS • PRESSURE GAUGES THERMOCOUPLES • HYDRAULIC VALVES • JET ENGINE AFTERBURNER CONTROL SYSTEMS.

resulting from the air flow over this mountain range.

The general weather conditions at 13,000 feet in the area were not conducive to carburetor ice. However, had any icing occurred, the prompt application of alcohol or heat should have eliminated this condition. Since icing became progressively worse at lower altitudes, there is a possibility that any appreciable delay in taking corrective action could have caused a forced descent into worsening conditions. There was an ample supply of alcohol for both the carburetors and propellers.

As mentioned previously, a strip of hard ice was found on the leading edge of the de-icer boot, parallel to the exposed upper surface of a wing. Although this ice was observed five days following the accident, there were strong indications that it had accumulated on the wing during descent. No ice was seen on the other exposed parts of the airplane and the absence of glazed ice or icicles on the boughs of trees is indicative that the wing ice had not formed following the accident. The configuration of the ice precludes the possibility of it having formed as a result of rain droplets after the crash of the aircraft.

Furthermore, blunt condition of both ends of the ice strip strongly suggests that it was the remaining portion of a larger ice layer on the leading edge which could well have been broken off during the crash. Since this ice was on the de-icer boot, it shows that is was forming on the boots so rapidly during descent that action of the boots themselves was not sufficient to break off and remove the ice completely.

Investigation disclosed that the aircraft struck on a heading almost 100 degrees from its intended course. This gives rise to the belief that during the descent a rapid accumulation of ice on the top surfaces of the wings would have seriously impaired the lift of the aircraft and probably adversely affected controllability despite the fact that the de-icer boots could have been operating at the time. The airplane could not have maintained proper altitude, much less climb, had these conditions existed, even though maximum continuous power was then being used.

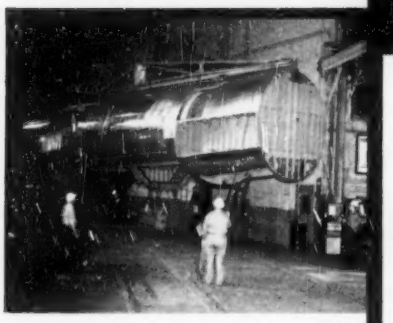
It is well known that the rate of ice accretion and its quantity vary greatly under different conditions of temperature, moisture content, etc.[4]

About 42 miles back from the crash site, over Malad City, the flight reported as being at 13,000 feet. The elapsed time from the Malad City report to the time of crash was about 14 minutes. Thus the ground speed over these 42 miles was about 180 mph. Previous legs of the flight had been logged at ground speeds of 220-230 mph. But the distance of the final segment, from Malad City, is short and the time determinations are subject to some error. Therefore, it may be presumed that the flight lost altitude while continuing straight ahead and on course at a somewhat reduced speed until shortly before the accident when a left turn was made. (The crash site was only about two miles from the center of the airway.) This somewhat-reduced speed can be accounted for by the fact that light to moderate turbulence

[4] Ice on aircraft and its harmful effects has been the subject of much research by the National Advisory Committee for Aeronautics and others. This subject was recently referred to in the Board's Accident Report SA-274.

FROM THIS

...TO THIS



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*A Record of Achievement . . .*

From an empty plant to full-scale production of a major airframe component within seven months is a record held by Oliver Aviation. This record was accomplished by Oliver Aviation in producing a fuselage section forty-five feet in length, ten feet in diameter and weighing approximately 8,000 pounds: one of the largest aircraft assemblies ever subcontracted by the Boeing Airplane Company.

This unusual achievement is adequate proof that the Oliver Corporation has the ability and the "know-how" to remain a definite factor in the aircraft industry.

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## Nehru Tries Copter

Prime Minister Nehru of India recently had his first ride in a helicopter at Bombay. In a Hiller 12-B purchased by the City of Bombay, he was introduced to whirlybird flying by Mike Meger, Hiller pilot.

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## LORD ENGINEERING CONTROLS VIBRATION . . . anywhere!

The improvement of your product in operation may be only a matter of control . . . control of destructive vibration or shock. Lord Vibration and Shock Control Mountings of Metal, Natural Rubber, Silicone, Neoprene, Buna S, Buna N and other materials are available for application in a wide diversity of industrial machines, the varied vehicles of transportation, home appliances, business machines and sensitive electronic equipment. May we work with you to "design out" vibration and shock inherent in machines already on the market . . . and on new products being designed?

The motor of the Model T-700 Revere Recorder is protected by Lord Vibration Control Mountings. The Idler Wheel used in this recorder is also a Lord Bonded-Rubber Part.

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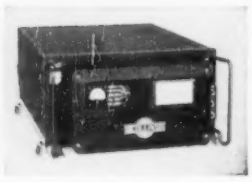

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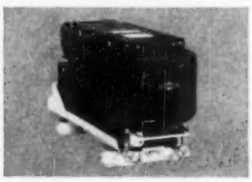
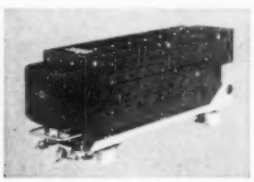
*TRANSCEIVER*

Completely automatic tuning. 144 channels. Full 100 watts power. Frequency range 2.0 to 25.0 mc. Exclusive Collins Mechanical Filter in IF circuit. Uses one crystal for both transmitting and receiving.



*51V-2 GLIDE*
*SLOPE RECEIVER*

Designed for reception of glide path signals on any of the 20 channels in the UHF range, 329.3 — 335.0 megacycles. Fully meets ARINC specifications developed in collaboration with engineers of several leading airlines.



*51R-3*
*NAVIGATION RECEIVER*

Fulfills navigation and communication receiving requirements of all types of commercial aircraft using the 108 to 136 mc. band. Provides for omni, ILS, and VHF communications. The standard omni receiver for aviation.

*130L-2 AUTOMATIC*
*ANTENNA TUNING UNIT*

Designed for use with transmitters operating in the H-F spectrum. Requires no manual adjustment for initial installation, change in frequency or change of antenna. Automatically matches 618S output to aircraft antenna.

existed at the cruising level and became worse at the lower altitudes. (The company's Operation Manual specifies a speed reduction to 140 mph. through turbulence.)

The flight previously mentioned, also eastbound, and only a few minutes earlier, did encounter some turbulence in the area and this pilot avoided it by increasing his altitude from 13,000 feet to 13,500 feet.

The crash site was several hundred miles from Cheyenne, the point of next intended landing, far too distant to start a letdown of the plane.

The fact that the aircraft was overweight by 401 lb. when it left Boeing Field cannot be considered as pertinent because the aircraft's weight at the time it crashed was some 3,000 lb. less than the weight at takeoff, due to fuel consumption during the flight.

The Board concludes from the evidence available that the aircraft encountered severe turbulence and the formation of heavy icing of the aircraft which precipitated its descent and subsequent crash. The Board is unable to state why the flight did not request and proceed to a higher altitude to clear the tops of the clouds. The reason for the initial descent is not known.

## FINDINGS

On the basis of all available evidence the Board finds that:

1. The carrier, the crew and the aircraft were properly certificated.
2. Both the captain and co-pilot had received the required rest period at Seattle.
3. The flight was routine until passing Malad City, the last reporting point.
4. The flight reported being over Malad City at 13,000 feet, its assigned altitude.
5. Light to moderate turbulence and light rime ice prevailed in cloud tops at cruising altitude, while at lower altitudes moderate to severe turbulence and moderate to heavy icing existed.
6. Ice found on the wing had formed in flight.
7. The crew had been adequately briefed by the U. S. Weather Bureau as to weather over the route prior to departure from Seattle.
8. All major components of the aircraft were identified and examination of the wreckage disclosed no evidence of malfunction, failure or fire prior to impact.
9. Both engines were developing power at impact.
10. All navigation aids along the route were reported normal.
11. The accident occurred within the airway and slightly to the left of course.

## PROBABLE CAUSE

The Board determines that the probable cause of this accident was the inadvertent descent into an area of turbulence and icing which resulted in the flight's inability to regain a safe altitude.

By the Civil Aeronautics Board:

/s/ Oswald Ryan
/s/ Harmar D. Denny
/s/ Josh Lee
/s/ Joseph P. Adams
/s/ Chan Gurney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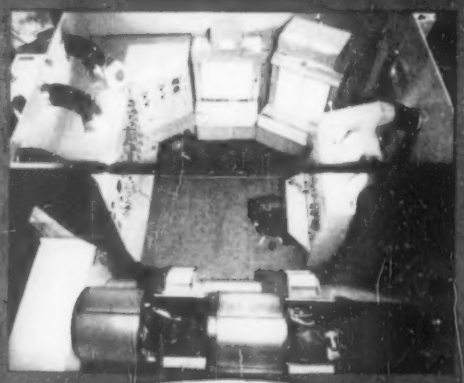

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## Telling the Market

**Quick Facts to Aid in Selecting Die-Less Duplicating Equipment** is booklet describing faster and more economical ways to form and fabricate material through use of Di-Acro Precision Metal-working machines. Write O'Neil-Irwin Mfg. Co., 300 Eighth Ave., Lake City, Minn. . . . **Power-driven brushes** for de-burring, roughing, stripping, polishing and other operations are covered in booklet available from C. W. Morris Co., 10628 Cloverdale, Detroit 4.

**Shaft Inspection—By Optical Gaging** using dual-image idea of two simultaneous images on a contour projector screen, also applicable to other production parts, is title of booklet being distributed by Optical Gaging Products, Inc., 26 Forbes St., Rochester 11, N. Y. . . . Details of **precision Swiss-made machine tools,** including light and standard duty plain and universal millers, universal shapers, and hydraulic hacksaws, are contained in folder available from Austin Industrial Corp., 76 Mamaroneck Ave., P. O. Box 430, White Plains, N. Y.

**Lock and eject collet-type floating holders** to compensate for misalignment between tool and work on drilling, tapping and reaming, are covered in booklet that can be obtained from Scully-Jones & Co., 1901 So. Rockwell St., Chicago 8, Ill. . . . **Micronic filters** for the aviation and petroleum industries are technically described in large catalog obtainable from Bulk Filtration Division, Purolator Products, Inc., 970 New Brunswick Ave., Rahway, N. J. . . . **ABC of Jet Propulsion** is an 18-min. color movie describing basic principles of jet, turbines and rockets using animation techniques. It is available on loan through the public relations department of General Motors, Detroit.

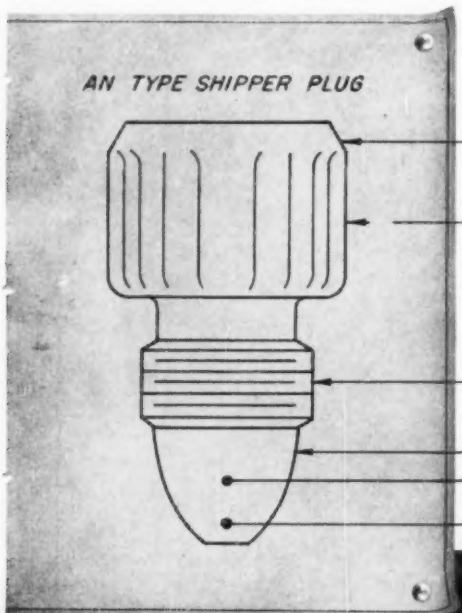
**Quick-seal leakproof hose coupling** for water, oil, steam, gas and chemical lines is described in bulletin available from Industrial Sales, Titeflex, Inc., Hendee St., Springfield 4, Mass. . . . Sciaky MP-2 series air-operated, press-type, low-impedance, single-phase **seam welder** available in 18-in. to 48-in. throat depth and 1,500-lb. to 3,000-lb. maximum electrode force is detailed in Bulletin 321-7. Available from Sciaky Bros., Inc., 4915 W. 67 St., Chicago, Ill. Firm also has Bulletin 322-10 on its **hydro-pneumatic boosters** which can use water as their hydraulic fluid.

**Conventional and self-locking set screws** are described in Catalog 19, which also gives screw thread data. Write Set Screw Mfg. Co., 679 Main St., Bartlett, Ill. . . . **Standard hand-detachable counter bores,** holders, countersinks and pilots as well as counterbore sets are covered in Bulletin 60446 available from Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

## Publications Received

- **Pilot**—by Tony LeVier as told to John Guenther—Pub. by Harper & Brothers, 49 E. 33rd St., New York 16, N. Y.; $3.50; 263 pp. Life story of test pilot Tony LeVier.
- **Airplane Design**, Tenth Edition—by Karl D. Wood—Pub. by the author; distributed by the University Bookstore, Boulder, Colo.; $7.50. Textbook and handbook on airplane and helicopter layout and preliminary design calculations, with emphasis on the economics of design.
- **The Next Fifty Years of Flight**—as visualized by Bernt Balchen and told to Erik Bergaust—Pub. by Harper & Brothers, 49 E. 33rd St., New York 16, N. Y.; $3.00; 214 pp. Col. Balchen offers his predictions for the next 50 years of aviation development.
- **Residual Stresses in Metals and Metal Construction**—edited by William R. Osgood—Pub. by Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y.; $10.00; 363 pp. Describes and evaluates the effects of residual stresses upon the performance of various kinds of structures.


# What is the Accepted Standard?

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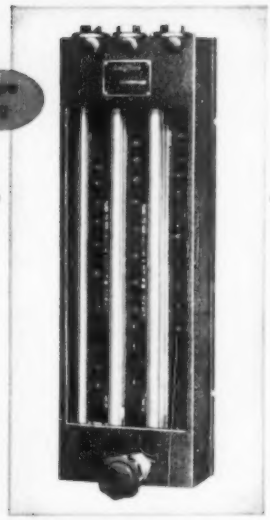
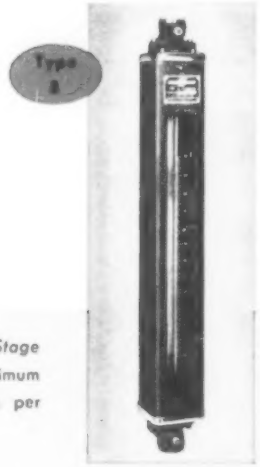
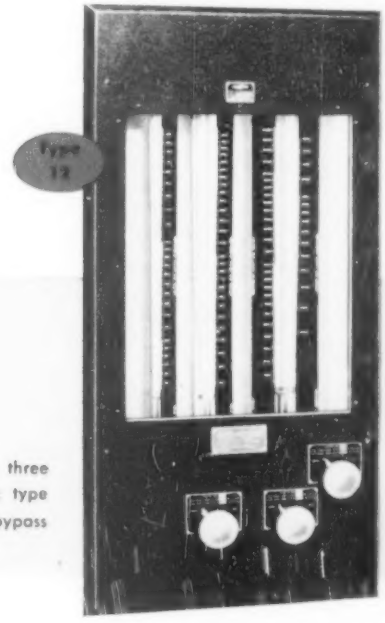
are designed for flow rate measurement of fuels (such as gasoline, kerosene, diesel and jet fuel) and of many liquids and gases. They are built for use in the laboratory, in a wide range of production processes, or for a combination of the two.




**For the Laboratory:** *Type 10 Multiple Stage Flowmeters,* designed as a compact laboratory instrument for precise measurement of smaller fluid flow rates.




**For Production:** *Type 8 Single Stage Flowmeters,* engineered for a maximum flow capacity of 50,000 pounds per hour




**For Both:** *Type 12 Multiple Stage Flowmeters,* available in three series — the 40, the 90, and the 100. Each has logarithmic type scales for excellent readability and can be equipped with a bypass orifice to greatly increase flow capacity

Individually graduated scales; patented "Inner Wall" guides that insure perfect float centering within the metering tube; and extra-sensitive floats are a few of the major features of Cox Flowmeters. Scales are graduated for a specific fluid. Scales for metering other fluids can be easily interchanged. Multiple Stage Flowmeters are available for wide flow ranges, and bypass orifices can be built in which greatly increase the flow capacities without increasing panel space required.

The Type 12, 40 Series Flowmeter, available in single and multiple-stage units, is firmly established as the most accurate variable-area flowmeter now made. Each individually graduated logarithmic scale is accurate to within $\pm \frac{1}{2}$ percent of the actual flow at any point on the scale. It is readable to within $\pm \frac{1}{4}$ percent of indicated flow at any point.

*Look for Other* CRL *Products*

- AIR FLOWMETERS
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Since passing its first CAA test 5 years ago, Skydrol remains the only fire-resistant hydraulic fluid with CAA approval. Airline acceptance of Skydrol has been phenomenal... 20 major companies* are using it today. Some reasons why:

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**PASSENGERS BOARD** National S-55 at Ft. Lauderdale after craft has been flagged down, indicating waiting customers.

# NAL Accumulates Valuable Copter Data

- **Baker banks on Florida experience with S-55.**
- **He hopes to keep lead when bigger craft come.**

**By Richard Balentine**

National Airlines, first U.S. trunkline to operate scheduled passenger helicopter service, is paving the way for a major role in the copter transport field when larger aircraft become available.

G. T. Baker, NAL president, says: "When 30- to 40-passenger helicopters are available, and indications are that this is not far distant, short-hop air transportation between heavily populated areas will take its rightful place in the pattern of world-wide travel by air.

"When this time comes, the knowledge we have already gained from operation of our (Sikorsky) S-55 should keep us out in front."

▶ **S-55 Experiment**—National operates a seven-passenger S-55 under a Civil Aeronautics Board one-year exemption, linking Miami and Palm Beach International Airports with Bal Harbour, Hollywood, Ft. Lauderdale, Boca Raton, Delray Beach and West Palm Beach, Fla.—an air distance of 75 mi. (AVIATION WEEK Jan. 25, p. 88). Flights are scheduled to connect with longhaul flights at Miami and Palm Beach as a supplemental service.

A passenger arriving at Miami Inter-

**NEW MAXIM MUFFLER** fitted to NAL Sikorsky S-55 is viewed by (r. to l.): Igor Sikorsky, NAL president Ted Baker, E. Gustafson, assistant sales manager of Sikorsky, NAL vice president John Morris and the airline's director of copter operations, Charles Cover, Jr. (kneeling). View below shows the overall installation of the new muffler which is stated to cut helicopter's external noise 90% on takeoff and some 70% while in flight.

**NAL S-55** flies from post office roof to Miami Airport in demonstration.

**YOUNGSTERS** are checked aboard NAL's one seven-passenger Sikorsky S-55.

**COPTER MAINTENANCE** goes on under floodlights at NAL's Miami overhaul base.

national can climb aboard an NAL S-55 and, in little more than an hour, be in Marina Park opposite the Chamber of Commerce in downtown West Palm Beach at a cost of $18.86 plus tax. By Greyhound bus, the trip requires two and a half hours at $1.50.

At that rate, National is not competing with bus transportation. But it figures helicopter service should be considered as an air bus or air taxi. Because of the numerous bays, inlets and swamps in southeastern Florida, NAL believes the copter is well suited since it is not confined to the circuitous routes that taxis and buses must travel.

In the Miami area, it actually is cheaper to fly NAL's helicopter from the airport to MacArthur Causeway near downtown Miami than travel by taxicab.

▶ **'Playing Around'**—It costs National 90 cents a mile in direct expenses to operate its S-55, the airline figures. Baker is frank to admit that he's not making money on the operation, adding: "We're just playing around with it for the time being."

Big problem is to convince travelers of the practicality and safety of the helicopter, says Capt. Charles E. Cover, Jr., NAL's director of helicopter operations. Cover, 34-year-old pilot with well over 1,000 hr. in helicopters since 1945, believes that "once you get a passenger up in a copter, he'll be back for another ride."

▶ **Summer Slump**—Since Florida's winter season has ended, NAL has experienced a sizable slump in its helicopter business. During the first month's operation in February, the airline carried approximately 1,500 passengers. During the summer season, it is averaging an estimated 1,001 passengers a month.

In addition to seasonal effect, National's principal problem has been to get back into Miami Beach, a particularly lucrative stop on the 75-mi. route. Irate Miami Beach citizens succeeded four months ago in banning the helicopter from within their city limits. The reason: too noisy.

This has made a considerable dent in National's business. During the early days of the operation, the airline provided service from Miami Beach and all three of southern Florida's race tracks. Heliports were established close enough to the betting windows at Hialeah, Gulfstream and Tropical Park so that NAL had no trouble filling S-55 seats.

When the racing season opens later in the year, National expects to resume operations to the tracks. Whether Miami Beach will be included is uncertain.

▶ **Muffled Roar**—To counteract the Miami Beach hostility, NAL has fitted its S-55 with a muffler to cut down the noise. Developed by Sikorsky and built by Maxim Silencer Co., the muffler is designed to cut down 90% of the external noise on takeoff and 70% in flight (AVIATION WEEK May 17, p. 10).

In a recent demonstration behind Miami Beach Auditorium, National's former beach heliport, the airline showed Mayor Harold Schapiro, Igor Sikorsky, various city officials and residents of adjacent properties the difference the muffler made.

It was clear that the muffler did dampen the roar of the single Pratt & Whitney Aircraft R1340 engine, but it was difficult to convince the citizenry. They discovered that, muffler or no muffler, you can not kill all the noise when flying an airplane.

▶ **Reaction**—"If I had wanted to build my house near the airport, that's where I would have put it," said one woman. "This is a resort town. We want to live out here in peace and quiet without the roar of airplanes in our backyards. Besides, every time your helicopter comes near, it throws my television set out of whack."

"If you think this changes my mind, you're quite mistaken," one man told President Baker, after watching the demonstration. "If you guys want to bring that confounded machine right into my backyard, then I'll trade you my house for yours."

Despite the demonstration and opportunity to talk with National officials, it seemed clear that NAL still had a fight on its hands to recapture the Miami Beach copter trade. The airline faces a hearing on the issue on Miami Beach in August. Chances are there will be another citizen's petition to continue the ban on the helicopter.

▶ **'New Sound'**—"Regardless of the effect of the muffler," one of NAL's helicopter pilots explained to AVIATION WEEK, "this is a new sound. People have to get used to it before they will accept it. It's like the early days of the automobile, before the horse became accustomed to the sound of the wheezing horseless carriage."

At no other point along its route has National experienced a noise problem. Aside from the two airport stops, NAL operates into and out of heliports in fairly heavily populated areas.

At Delray Beach, for example, the heliport is located on the north end city athletic field. At Ft. Lauderdale, a small macadam area behind one of the local service stations serves as heliport. Hollywood Beach Hotel has a heliport for that community. Miami's heliport is a grassy field on MacArthur Causeway within a mile of the city's center just off a main highway which leads in from Miami Beach.

A small schedule board advertises each spot as the heliport. Terminal facilities exist only at the airports at each

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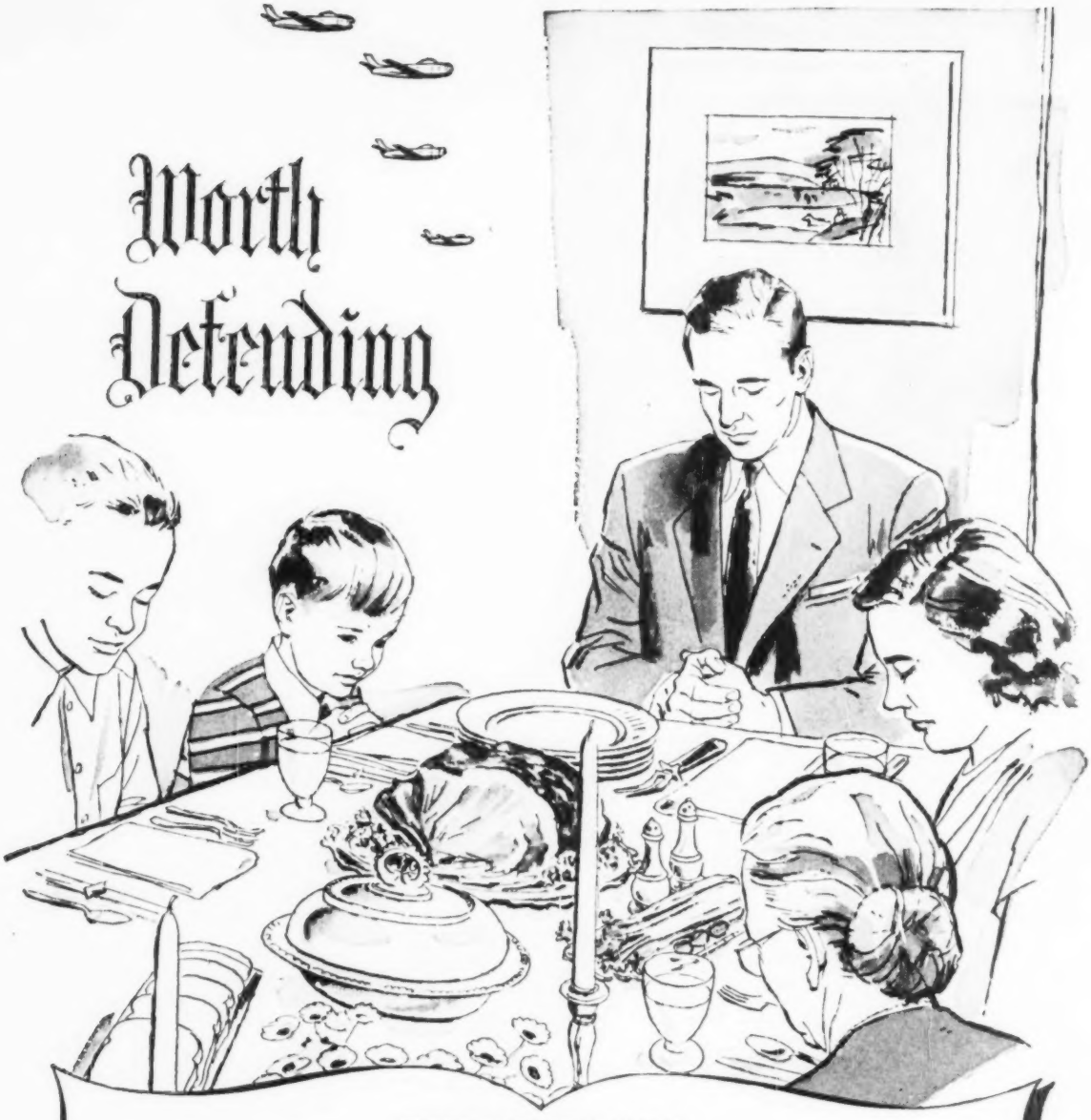

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end of the route. At this point the airline sees no need for terminal buildings at heliports. Ticketing is handled by the pilot or during the busy season by a stewardess who rides in the passenger cabin.

Taking a cue from the railroad, the airline flies a flag to notify the pilot whether passengers await at the heliport below.

▶**Pilot Rules**—As NAL gathers experience, pilots too are coming up with new ideas on their role in the operation. At the moment there is no air transport rating specifically for helicopter pilots. Thus they must conform to the temporary copter regulations as established by Civil Aeronautics Administrator F. B. Lee.

For example, the helicopter pilot, no matter how much flying time he has before he is employed to fly passenger copters, must have 150 hr. of transition, training and check time on rotary-wing aircraft before he is allowed to carry passengers.

"There should be a change in the regulations," says Capt. Cover, "by establishing a separate set of rules specifically for the helicopter. Something should be allowed for former experience."

Meantime, NAL is checking out the last of its five helicopter pilots by using them as co-pilots on daily runs.

▶**Air Bus**—Cover says there is no reason for the required name-and-address manifest for helicopter passengers that was adopted for regular airline operation.

"Treat the helicopter like a Greyhound Bus," he says. "A passenger should be able to hop on an air bus just as easily as he could a trolley car."

NAL's helicopter director suggests that the regulation prohibiting night passenger operation for single-engine aircraft might also be waived in the case of the helicopter.

▶**Charters Gain**—In between its scheduled flights each weekday, National's S-55 is available for charter. This part of the business is growing as individuals and private companies learn of the potential of helicopter travel.

Recently Humble Oil Co. chartered the copter to prospect a piece of land it owned in a fairly inaccessible section of the Everglades. By helicopter, the task was fairly simple, the company found, whereas by boat it would have been an arduous trip through the swampy Glades.

Eventually National may be operating helicopter service in the vicinity of Tampa, Fla., and Norfolk, Va. Both cities have asked for the service, but NAL has made no move to ask CAB for the routes. National has an option to buy two more S-55s from Sikorsky which it could use in such additional operation.

## Local Service vs. Trunk Growth

Statistics presented to the House Commerce Committee by C. A. Myhre, president of Frontier Airlines, show the growth of local air services over the past five years has been substantially greater than that of the trunk carriers.

| | Local service | | Domestic trunk | | |
|---|---|---|---|---|---|
| Year | | Growth % | Year | | Growth % |
| Passenger revenues: (dollar volume in millions) | | | | | |
| 1953 | $23.3 | 215 | 1953 | $782.2 | 107 |
| 1952 | 19.8 | 168 | 1952 | 671.3 | 78 |
| 1951 | 16.3 | 120 | 1951 | 570.3 | 51 |
| 1950 | 10.3 | 39 | 1950 | 430.1 | 14 |
| 1949 | 7.4 | | 1949 | 378.1 | |
| Revenue passenger miles: (dollar volume in millions) | | | | | |
| 1953 | $390.9 | 190 | 1953 | $14,297.6 | 118 |
| 1952 | 339.8 | 152 | 1952 | 12,120.8 | 85 |
| 1951 | 289.6 | 115 | 1951 | 10,210.7 | 56 |
| 1950 | 188.8 | 40 | 1950 | 7,766.0 | 18 |
| 1949 | 134.7 | | 1949 | 6,562.6 | |
| Passenger load factor: | | | | | |
| 1953 | 38.36% | 36 | 1953 | 64.65% | 10 |
| 1952 | 37.55 | 33 | 1952 | 67.08 | 14 |
| 1951 | 37.39 | 33 | 1951 | 69.59 | 18 |
| 1950 | 31.51 | 12 | 1950 | 62.70 | 6 |
| 1949 | 28.18 | | 1949 | 59.03 | |

SOURCE: Civil Aeronautics Board reports.

# Longer Certificates for Feeders?

**CAB favors seven-year licenses, but airline spokesmen say they need permanent right to develop services.**

By Katherine Johnsen

Chairman Chan Gurney has put Civil Aeronautics Board on record in favor of "longer term" certificates to increase the stability of local service airlines.

"As routes are bettered and they make progress toward self-sufficiency," he told the House Interstate and Foreign Commerce Committee, "it is the Board's intention to give longer term certificates."

Gurney favored seven-year certificates, which he called "next door to the permanent certificate." Original certificates were for three years. Only two of the 14 feederlines so far have received seven-year renewal certificates—Piedmont Aviation and Mohawk Airlines.

Seven local service airline certificates are up for renewal this year: Bonanza Air Lines; Lake Central Airlines; Ozark Airlines; Pioneer Air Lines; Southwest Airways; Trans Texas Airways, and West Coast Airlines.

▶**Legislation Unlikely**—Gurney refused to modify opposition to legislation directing permanent certificates to existing local service lines.

In earlier Senate testimony he anticipated that, "in a relatively few years," the local carriers will be ready for permanent certification. Commerce Department's position parallels that of CAB.

In testimony to the Senate Commerce Committee, Commerce Undersecretary for Transportation Robert Murray recognized "the desirability of giving all carriers the degree of stability provided by permanent certificates wherever justified and at the earliest date possible."

But, he said, this should be accomplished gradually by CAB.

With congressional adjournment nearing, the chance of enactment of the permanent certificate legislation, introduced in the House by Rep. Carl Hinshaw, acting chairman of the Commerce Committee, appears to be unlikely.

Sen. Pat McCarran has introduced a companion measure in the Senate.

▶**Political Pressure**—The House hearings did demonstrate the heavy political pressure on the Board to improve the position of the local service systems that reach into virtually every congressional district. Few aviation hearings

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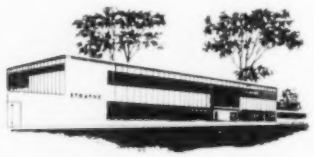

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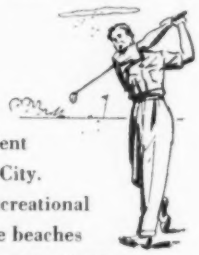

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on Capitol Hill have generated as much interest among members.

Highlights of testimony:

• It was disclosed that the Administration is opposed to government financial assistance for the development of economic aircraft for local service, although the Air Coordinating Committee recommended it, 4 to 3.

CAB, Army, Navy, and State Department representatives on ACC favored the aid. Post Office, Air Force and Commerce Department representatives opposed it, stating the Administration position.

The Budget Bureau suggested that military development of the helicopter "may meet the needs of some." If there were a substantial market for local service aircraft, the bureau declared, "The current financial position of the major aircraft manufacturers would enable them to devote private funds to necessary development work."

• Hinshaw attacked the ACC report and declared it proposed "the cannibalization of the existing local service lines by the large carriers and failure to renew the certificate of the small carrier, which is developing the route."

The committee is investigating the Southwest Airways case in which United Air Lines, with CAB's approval, has asked for Southwest's routes, connecting the main points of Los Angeles, San Francisco, Sacramento and Medford, Ore.

• Rep. John Heselton, who has worked unsuccessfully for legislation separating mail pay and subsidy and setting a strict formula for service mail rates, made it clear that he is in favor of justifiable subsidy for feederlines.

"When it is justified and explained, the American people will accept it," he said.

• Criticizing CAB and Administration opposition to permanent certificates, Rep. Arthur Younger gave this view of the problem: "The local service lines can't become self-sufficient without a better plane. They can't get a permanent certificate without meeting requirements of self-sufficiency. They can't get a new plane without a permanent certificate—to assure prospective financial backers they are here to stay."

• Rep. Homer Thornberry said he had some regrets over supporting the designation of subsidy in mail pay "because it has now been seized upon to cripple local air service."

► **'Give It Milk'** – Excerpts from the ACC report that aroused criticism at the hearings were: "Routes should be promptly amended to eliminate points which have demonstrated an inadequate traffic potential to justify scheduled air service. There may also be some opportunities to develop improved route systems through mergers between local carriers, or between local and trunk carriers . . . where continued and significant progress toward self-sufficiency is not demonstrated by a local service carrier, its operating authority should be terminated in an orderly fashion. . . . "

"Why couldn't the policy be to extend the local service carriers to some bigger cities?" Hinshaw suggested. "That is the way to give it milk."

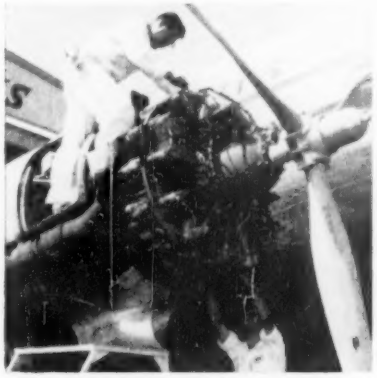
Commenting that Congress was not consulted by ACC in connection with the report, he added: "It is the business of Congress to establish policy and not necessarily the business of the ACC to tell Congress what it should do."

He said the President signed the report as a routine action and that he was uninformed on its contents. "I would not like to think Mr. Eisenhower was making the mistake which is contained in that report," Hinshaw declared, "and I am sure he would not if he understood it."

Donald Nyrop, representing the Conference of Local Service Airlines, said his clients "have been the most unfortunately treated of any major segment" of the aviation industry in the ACC report.

One local service spokesman, however, defended the report as "excellent." Robert Peach, president, Mohawk Airlines, told the committee: "In inviting trunk carriers to apply for the routes of Southwest Airways, the CAB has failed apparently to understand the ACC report.

"The only way to eliminate subsidy payments for uneconomical airline service is to eliminate the service. Transferring to trunk carriers the economic bur-



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den of those communities served by local carriers who do not pay their own way would result in merely changing the payee on the subsidy checks."

▶ **View of Feeders**—Local service representatives emphasized that permanent certificates are necessary for lines to obtain financing to improve their services, develop traffic and get off government subsidy. They said local carriers already have established "public convenience and necessity" and that they are "fit, able, and willing" in their original certification cases and in later renewal cases.

Gurney argued that route structure is the key to getting on a firm footing. CAB wants to work hand-in-hand with the industry to develop sound operational patterns, he said. The Board's authority to modify permanently certificated operations, he maintained, does not leave sufficient authority to make changes.

"The Board wants to cooperate with the local service lines in making each line the best in its own area," he said. "That is our policy at the moment. . . . I have not found any in the local service field that are not doing a mighty fine job of running the airline they have."

Points made at the hearing included:

• **John Connelly,** president of Southwest Airways, said trunklines were not required to make showing of "fitness, willingness and ability" when they were given grandfather rights in 1938. In the 1934 Interstate Commerce Act, he added, grandfather rights were given truckers.

• **C. A. Myhre,** president of Frontier Airlines, emphasized the growth of local service lines and their enterprise in developing traffic at low population points. In 1952, he said, Frontier developed 297.8 passengers per 1,000 population from 25 cities on its route system in the Mountain States with populations under 25,000.

"Thirty cities under 25,000 population, in the same area but served exclusively by trunklines, developed only 132.4 passengers by comparison," he added.

• **Robert Smith,** president of Pioneer Air Lines, pointed to the disadvantages local lines must face in obtaining financing until they are on a permanent basis. Pioneer, he said, has had to pay interest at a rate of 5% in contrast with the 3.5% to 4% paid by trunklines.

"Two of Pioneer's principal stockholders were required to purchase 21.5% of the 75,000 new shares of stock," he told the committee.

• **Frank Hulse,** president of Southern Airways, complained that "the exhibits, briefs, and reports" in its original certification case "would make a pile well over 25 feet high. But this is not all. At the end of three years we had to

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go through the same process again, simply in order to continue to operate for another temporary period."

• **Laddie Hamilton,** president of Ozark Air Lines, objected that "equipment and real property can only be leased on a short-term basis with correspondingly higher costs."

# Balboa Impasse

- **Braniff rejects Panagra bid for S. A. operation.**
- **Beard calls offer too low for demonstrated value.**

Braniff Airways and Pan American-Grace Airways reached an impasse last week after failing to agree on establishing an independent airline for service along the west coast of South America.

The discussions, ordered by Civil Aeronautics Board, clearly were bogged down after Braniff rejected a Panagra bid to purchase BNF's international operations for $5 million in cash or stock of Pan American World Airways and W. R. Grace & Co. (AVIATION WEEK June 21, p. 87).

A Braniff official said: "We have both stated our positions categorically. Between us is the Grand Canyon."

▶ **'Wide Divergence'**—Early last week, Braniff notified the Board it agreed with Panagra president Andrew Shea that the "wide area of divergence" between both parties precluded any further efforts. A meeting had been scheduled June 29.

Shea wrote Ferdinand Eberstadt, chairman of Braniff's negotiation committee, that "we shall be glad to meet with you if you still consider that something constructive might come of such a meeting."

Both airlines said they were "most desirous" of reaching an agreement satisfactory to CAB. The Board ordered the two airlines last March to consolidate their routes into a single, independent system "in order to achieve a substantial reduction in mail pay subsidy requirements and, at the same time, permit competitive U.S.-flag carrier services to South America on an economically sound basis."

Braniff's position is that such a proposal must encompass:

• Integration of the routes presently certified to Braniff and Panagra into a single company.

• Maintenance by Braniff of a stake in South America through stock ownership in any company into which the international routes, franchises and properties of Braniff and Panagra are integrated.

Panagra, on the other hand, said:

• Acquisition of Braniff routes is out of the question since the only segments of the route operated under BNF's certificate that economically justify operations already are being served by Pan American and Panagra, with the possible exception of the Lima/Rio de Janeiro segment.

• Consolidation and operation of Braniff and Panagra's routes would result in substantially higher subsidy payments than required under present Braniff/Pan Am/Panagra operations in South America.

▶ **Route Value**—Charles E. Beard, Braniff president, informed CAB Chairman Chan Gurney recently: "Since Mar. 26, when CAB issued its decision in the reopened New York-Balboa case, we have endeavored to accomplish a result consistent with the Board's decision. To date our efforts have been unsuccessful.

"We are not seeking to abandon our South American operation," he wrote, "but instead are seeking ways and means of establishing a stronger U.S.-flag airline on the west coast of South America. . . . Nor are we prepared to eliminate the only American-flag air service authorized over many route segments in Latin America."

Braniff believes, he said, "these routes have demonstrated their value and should continue to be operated by the combined company resulting from the integration of Braniff and Panagra."

Beard wrote Gurney in connection with BNF's rejection of Panagra's $5-million bid. Braniff said this figure was too low.

▶ **Subsidy Factor Noted**—Eberstadt explained to Panagra that Braniff was not willing to abandon its South American operations because of the investment its stockholders have in the operation and the "great effort" officers and employes have devoted to the development of Braniff's routes.

"Your proposal," said Eberstadt, "contemplates the abandonment of our certificate of public convenience and necessity and the routes therein provided. This would mean the elimination of American-flag air service over many important route segments and we are not prepared through our own voluntary action to deprive the travelling public of these routes which they have patronized in ever increasing numbers since the service was first inaugurated.

"We are as anxious as you to reduce the amount of required government subsidy. However, we do not believe that the entire burden of reducing subsidy must fall on Braniff. Pan American and Panagra have an equal obligation, which to date they seek to discharge only by suggesting to us that we get out of South America. We could, of course, with equal logic suggest that Panagra abandon its routes and sell its equipment to us."


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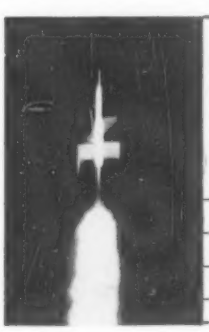

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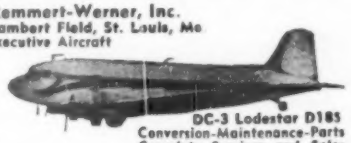

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# Strictly Personal

*(Editor's Note: The story appearing in this column June 21 describing Ajax Wheelbarrow and Airplane Works' big Mach 5.27 helicopter brought various reactions from* AVIATION WEEK *readers. Following are letters from two of them.)*

Gentlemen:

Inclosed you will find a copy of a letter I had sent to Sen. Bridges of N. H., of which am sure he will look into the situation thoroughly. If it is the news that I think it is, it certainly will be worthy any effort to find out about.

Hoping things break so that you may give us a story on these projects.

G. D., SOMERSWORTH, N. H.

(Copy)
Senator Styles Bridges, Chrm.
Senate Appropriations Committee
Washington, D. C.
Honorable Styles Bridges, Senator of N. H.

This week's edition of AVIATION WEEK magazine contained some very serious news, not only serious by its original disclosure, but also as to how and where it was first printed.

This news I am referring to concerns an aircraft project referred to as "Project Gone" and "Project Real Gone," according to AW these types of jet copters are being manufactured by Ajax Wheelbarrow Co. in California. This project was to have started in 1949, Uncle Sam had clamped rigid security restrictions on same, which held very well for a period of time.

The people in that area were aware of this project for sometime now, and the very serious news aforementioned in this letter concerned a news report by a Russian magazine 'Flizolkivich,' showing sketches and other data pertaining to this project. It is serious in its magnitude the fact that the Russian people were informed of such a project that we as yet know nothing.

I trust that you will do whatever possible to bring this news to the American public as I think a good deal of people in our country today would be very pleased to hear about it, even though the Russians knew of it aforehand.

G.D.

Sir:

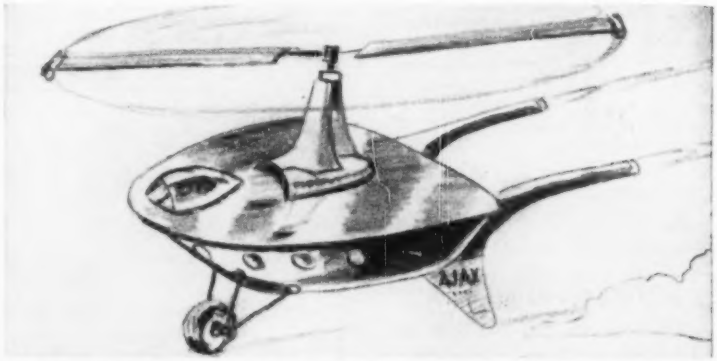
Your excellent magazine's disclosure recently about "Gone" came (no pun) as no surprise to the staff here at the consulate.

At times it is only proper to be completely candid, and inasmuch as you took the liberty of revealing your country's topmost secrets we will be equally candid and inform you that starting 10 years ago we began infiltrating both labor and management at Ajax Wheelbarrow. It was our own famous designer, Georgi Autorotovitch who was responsible for the conversion of Ajax's production to the supersonic "Gone," designed and test flew the "Real Gone" hinted at in your story, and was last seen taking off in the new prototype "All Gone."

By the time you have read this, we will have packed our bags and be winging our way back to the Soviet. You see, our mission here was not spying in your Top Secret plants, but to find out something more basic. In spite of our fantastic progress on rocket planes, H-bombs, and guided missiles, somehow we overlooked one essential item that could mean success or failure in a hot war with the U. S. A. Yes, by now you must have guessed—the wheelbarrow. We have been making the wrong approach all these years, utilizing four wheels, and it was only after years of subversion, plotting and dealing with 5th Amendment comrades were we able to learn of the one-wheel wheelbarrow.

Dig those crazy mixed-up security regulations.

IVAN EMMONIVITCH, Consul
Baltimore, Md.




**AJAX MACH 27 copter. Aviation Week artist's version of flying wheelbarrow.**

## AVIATION CALENDAR

**July 11**—Air show and dedication of Port Columbus Airport control tower, Columbus, Ohio.

**July 13-15**—Western Plant Maintenance Show, managed by Clapp & Poliak, Pan-Pacific Auditorium, Los Angeles.

**July 18**—Cole Brothers Air Show, sponsored by Ninth Group of the Civil Air Patrol, West Riverside Airport, Calif.

**July 22**—Third National Aviation Education Workshop, sponsored by Civil Air Patrol and the University of Colorado, Boulder, Colo.

**July 27-Aug. 5**—21st National Soaring Contest, Elsinore, Calif.

**Aug. 7-8**—Experimental Aircraft Assn., fourth annual National Air Pageant and second annual fly-in and convention, featuring "home-built" aircraft, sportsplanes, racers and antiques, Milwaukee.

**Aug. 9-10**—American Society for Quality Control, first annual Western Regional Conference, to be held in conjunction with the National Conference of the Aircraft Technical Committee, U. S. Grant Hotel, San Diego.

**Aug. 9-11**—Institute of the Aeronautical Sciences, turbine-powered air transportation meeting, Seattle.

**Aug. 25-27**—Western Electronic Show & Convention (WESCON), sponsored by West Coast Electronics Mfg. Assn. and Institute of Radio Engineers, Ambassador Hotel, Los Angeles.

**Sept. 4-6**—National Aircraft Show, Dayton, Ohio.

**Sept. 7-12**—Society of British Aircraft Constructors, 1954 Flying Display, Farnborough, England.

**Sept. 13-24**—Instrument Society of America, first International Instrument Congress and Exposition and third annual Analytical Instrument Clinic, Philadelphia.

**Sept. 21-23**—Society for Experimental Stress Analysis, annual meeting and exhibition, Bellevue-Stratford Hotel, Philadelphia.

**Oct. 4-6**—Tenth annual National Electronics Conference, Hotel Sherman, Chicago.

**Oct. 5-7**—Champion Spark Plug Co., 10th annual Aircraft Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.

**Oct. 5-9**—Society of Automotive Engineers, National Aeronautic Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.

**Oct. 17-22**—International Union of Aviation Insurers, annual general meeting, New York.

**Oct. 18-22**—National Safety Council, Aeronautical Section, Conrad Hilton Hotel, Chicago.

**Nov. 8-9**—National Aviation Trades Assn., annual convention and meeting, Biltmore Terrace Hotel, Miami Beach, Fla.

**Nov. 8-10**—Air Industries & Transport Assn. of Canada, annual meeting, Chateau Frontenac, Quebec City.

**Nov. 10-12**—Industrial Management Society, 18th National Time and Motion Study and Management Clinic, Hotel Sherman, Chicago.

**Nov. 12-14**—Texas State Aviation Convention, Galveston, Tex.

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## SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilts, Mgr.


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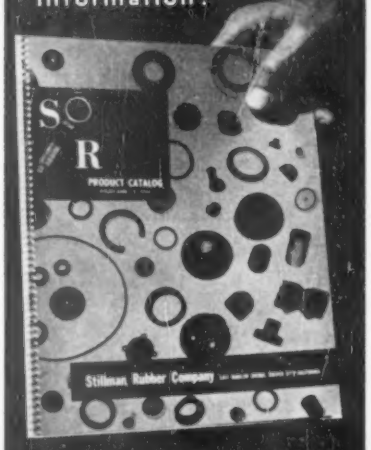


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**Longer Life For Your Windshield AND CLEAR — Comfortable — Safer Vision**

For preserving and cleaning plastic windshields. Non-abrasive. Will restore and maintain flexibility; helps prevent crazing and cracking. Restores visibility to old windshields by effacing mild scratches.

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PRICE—$1.25 pint Squirt Top Can FROM your Scott Dealer.

Established in 1907

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AVIATION CORPORATION
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**Write for FREE Scott Accessory Folder**

# EDITORIAL

## Distinguished Public Relations

You see a memorable advertisement on the front cover of today's AVIATION WEEK. It launches a notable campaign of four-color, institutional advertising paid for by Convair in behalf of the U. S. aircraft and air transport industries. The presentation is devoid of any Convair sales message in order to promote fully the theme that the world's best airliners are built in America.

The series is backed up by an appropriation of some $170,000, and will also appear in other aviation publications and in mass-circulation magazines.

To sophisticated aviation observers toughened by the intense competition between the major airframe companies, this first advertisement is a bracing tonic. Proposals for cooperative advertising programs even in the name of the Aircraft Industries Assn. frequently have fought losing battles for approval. Seeing one of the great leaders in the industry tackle such a campaign single-handed, with its own funds, and in messages that transcend self-serving commercialism, is unprecedented and invigorating.

Emmett A. McCabe, Convair's director of advertising, attributes the origin of the series to two recent developments: (1) a tendency in some advertising by American manufacturers to disparage products of their U. S. competitors; (2) a new campaign initiated by the British throughout the world on behalf of all British aircraft manufacturers. The series was already in preparation before the last Comet accident grounded the Comet 1 fleet, Col. McCabe said. Recent announcement by Capital Airlines that it was purchasing British Viscounts, with reports that another such deal is pending, add a note of urgency to the need to promote American unity, industry people admit.

Col. McCabe won Convair management approval for the revolutionary advertising, and enlisted Buchanan & Co., advertising agency, and its Kendall Mau, vice president, to help write the unconventional copy.

The first in the new Convair ad series would be an outstanding example of unselfish advertising in any industry, but in aviation it is unique, and deserves the wide recognition it will command for constructive public relations.

## 'The Proper Kind of News'

Like most business publications, the Wall St. Journal finds misunderstanding among executives who believe that only "official" news about industry should be reported.

After General Motors canceled its advertising with the Journal because of "objectionable" news stories, the Journal spoke some editorial words of wisdom. Classified national security information is not involved.

Some auto dealers, it wrote, feel that "this newspaper should publish only such news as is approved by the manufacturers, the dealers, or their trade associations. This would insure the proper kind of news being printed. . . ."

Except in the field of national security, the Journal noted, a newspaper, if it is to be honest and perform any service, can not concern itself with whether information is "authorized," but only with whether it is true and worth printing.

"No reputable newspaper will divulge information which it has agreed to accept in confidence, but it is under no obligation to suppress news freely obtained from reliable sources merely because the subject of the news considers it none of the public's business," the Journal explained.

Other readers feel it is a disservice to business to publish information which a particular segment of business doesn't want published.

"Sometimes what is valuable business news to one reader may be displeasing to another," the Journal noted, "but in the end the truth about what is happening is the only thing that is of value to anybody. And when a newspaper begins to suppress that news, whether at the behest of its advertisers or on pleas from special segments of business, it will soon cease to be of any service either to its advertisers or to business because it will soon cease to have readers."

It's an ever-timely subject worthy of occasional treatment on every editorial page.

—Robert H. Wood

# Carrier Based Jets to have Radar Guided Missiles

NAVY'S AIR-TO-AIR SPARROW 1 IN PRODUCTION

## THE STORY BEHIND THE STORY:

■ On May 12, newspapers from coast to coast carried headlines like the ones above, announcing the Navy's newest weapon of defense—Sparrow I—and the beginning of volume production for operational use in the fleets.

■ Ahead of these headlines were 7 years of intensive cooperative effort shared by the Navy's Bureau of Aeronautics and Sperry.

■ Originally designated project HOT SHOT, Sparrow began back in 1947 when the Bureau of Aeronautics assigned to Sperry the full responsibility of creating an entirely new air-to-air missile system. It had to be light and compact—so multiple units could be carried by fighter-type jets. It had to be deadly accurate—capable of outmaneuvering the swiftest bombers an enemy could produce. And it had to be practical—suitable for large-scale production.

■ The rocket-powered, radar-guided Sparrow I, coming off the production lines here and at the new Sperry Farragut plant in Bristol, Tennessee, meets these requirements—and more. It embodies the proved features of more than 100 different missiles designed, constructed and tested during a 7-year period—and the finest brains of an organization that has devoted more than 40 years creating and manufacturing automatic flight control and fire control systems.

SPERRY GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION • GREAT NECK, N.Y.

# NEW! ESNA BLUE "J's"

## High-strength aluminum-alloy nuts meet AN steel nut tensile loads. Nylon locking inserts guarantee reusability through 50 on-off cycles.

Approved for use on Air Force, Army and Navy aircraft, the new ESNA Blue "J's" are lighter than any other self-locking nuts of equivalent strength.

Intended for use with AN steel bolts and lubricated to minimize thread wear, the new ESNA Blue "J's" provide a smoothly uniform torque-tension relationship and forestall thread galling. They accomplish maximum fastener weight savings without sacrificing strength. Completely interchangeable with equivalent steel parts.

***Briefly, here's what we offer:***

**STRENGTH** . . . *Tested and approved to AN tensile strength specifications for steel nuts of the same size.*

**AVAILABILITY**. . . *sizes #6 through ¼" in designs that offer every important standard hex and anchor configuration including one lug, two lug, and corner types, floaters and gang channel.*

**NYLON INSERTS** . . . *in all anchor and channel types provide extended reusability — assuring elimination of maintenance problems created by replacement of "fixed" or inaccessible fasteners which are riveted or welded to the structure (hex nuts available with fiber or nylon inserts) and assuring the vibrationproof holding power, reusability and self-locking action provided in all ELASTIC STOP® nuts.*

## ELASTIC STOP NUT CORPORATION OF AMERICA

ESNA

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**Elastic Stop Nut Corporation of America**
**Dept. N46-725, 2330 Vauxhall Road, Union, New Jersey**
Please send me the following free fastening information:

☐ Details on ESNA Blue "J's" ☐ Here is a drawing of our product.
☐ ELASTIC STOP nut bulletin What self-locking fastener would you suggest?

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Firm_____

Street_____

City_____ Zone_____ State_____